



CORPORATION OF GLASGOW.

SMALLPOX, 1900-1902.

REPORT

BY

A. K. CHALMERS, M.D.,
MEDICAL OFFICER OF HEALTH.

20 FEB. 1923

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PROGRESS OF OUTBREAK.

GENERAL OUTLINE.

The course of the Smallpox prevalence which began in April, 1900, has, up till the date of reporting, presented, in a general way, three phases—a pre-epidemic period; one of epidemic severity within a comparatively limited area; and, after an interval of four months, a period of recrudescence.

The pre-epidemic period may be said to have lasted from the introduction of the disease in April, 1900, until the following December. The epidemic attained its maximum prevalence between January and March, 1901, after which the number of attacks rapidly declined, and the last sickening in this phase of the outbreak occurred on 29th June. It reappeared early in the following November, and again displayed considerable vigour during the spring months of the present year.

The separation of these periods is fairly definite, although, even in the early weeks of the pre-epidemic stage, there was already evidence of widespread activity, and in the middle of the epidemic period an interval of decreasing prevalence occurred, which extended from 1st to 18th February, and separated the periods of maximum sickening, which had occurred on 17th January and again on 1st February, from a period of more sustained prevalence, beginning on 19th February and ending on 2nd March.

The disease was introduced, under circumstances to be afterwards described, into an overcrowded one-apartment house in District No. 11 (Calton), which forms part of the eastern limit of the Central Sanitary District.* Ten or twelve days elapsed before medical attendance was sought and the nature of the disease recognised, with the result that in this and the next following fortnightly period cases occurred in eight households in the same tenement, and in others elsewhere, in persons, some of whom were only then found to have been resident in, or visitors to, this tenement during the unrecognised period of the first patient's illness. During the first fortnight of the outbreak (ending 21st April) all the cases registered were among residents in the tenement in question, but already in the second fortnight (ending 5th May) four almost simultaneous attacks occurred in one household in the Eastern (Preston Street), which had no traceable connection with the earlier cases, and in the third fortnight (ending 19th May) cases were recorded in all the districts save the South-Suburban and North-Western. In this last fortnight the cases numbered 21 in all, and 5 only of them could be associated with known sources of infection. In the fortnight which ended 2nd June the new cases registered had a similar distribution, with the inclusion, however, of two from the South-Suburban area. The North-Western remained free from the disease till the closing fortnight of the year, when one case was registered.

* For statistical purposes the whole area of the City is divided into 34 Districts, which, for purposes of administration, again are combined in 7 Groups, known also as Districts, and, for convenience, referred to as East, Central, Northern, Southern, Western, South-Suburban, and North-Western.

So far, a large proportion of the cases had occurred in the Central District, in which the disease began, and until the close of the fortnight ending 2nd June, of the 72 cases which had been registered, 33 were from the Central and 18 from the Eastern Districts of the City. In the following weeks a change in the distribution occurred, accompanied by evidence of increased activity in the propagation of the disease. During the fortnight ending 16th June 40 new cases were registered, 27 of which were in the Eastern District; and in the fortnight ending 30th June this district contributed 34 of the 58 cases then recorded. This exaggerated incidence in the Eastern District continued to characterise almost all the subsequent fortnights until the disease disappeared in the following summer, and it again became a feature in the development of the recrudescence in the spring of 1902. Although most of the other divisions in turn developed definite, and sometimes repeated foci of infection, there occurred in none of them any prevalence at all equal to that presented by the Eastern.

In the late summer and autumn of 1900 the disease abated, but late in November an increase began, which finally reached its maximum intensity in the week ending 19th January, 1901, when 255 new cases occurred.

In the following week the new cases fell to 93, but again in that ending 2nd February 111 sickened. The next fortnight was characterised by diminishing prevalence, 89 cases being recorded in the first and 62 in the second week; and the absence in this latter week of an increase, which might be assumed to have an incubation period in definite time-relationship with those which had occurred in the week ending 2nd February, appeared to indicate a moderation in the intensity of the outbreak. In the three weeks which followed, however (23rd February, 2nd and 9th March), 100, 172, and 107 newickenings occurred. In two periods, therefore, each of three weeks' duration, and separated by an interval of two weeks 459 and 379 cases occurred; but whereas in the first period there was a markedly diminished prevalence in the middle week, the prevalence during the last three weeks was maintained throughout. To this circumstance we shall return.

In the period of recrudescence the distribution followed the main lines of the pre-epidemic and epidemic prevalence.

It will be convenient here to tabulate the number of cases registered in the several Sanitary Districts in the successive fortnights of each of the three periods just referred to, and the accompanying maps should be referred to for information regarding the general arrangement of the districts. The figures given in the Tables here referred to include all admissions, and consequently contain some (27 in all) in which the subsequent development of symptoms warranted the exclusion of smallpox, although the records of the individual fortnights had been closed before the necessary corrections could be made. For this reason the numbers here given are in excess of the revised figures to be subsequently dealt with:—

TABLE I.—PRE-EPIDEMIC PERIOD, APRIL—DECEMBER, 1900.—CASES REPORTED IN THE SEVERAL FORTNIGHTS.

Fortnight ending	Central.	East.	North.	South.	West.	S.-S.	N.-W.	Whole City.	No. in Hospital.
21st April, -	9	...	...	...	...	...	...	9	8
5th May, -	6	7	...	...	...	...	...	13	20
19th „ -	7	2	9	2	1	...	...	21	27
2nd June, -	11	9	5	1	1	2	...	29	40
16th „ -	4	27	2	7	...	...	...	40	61
30th „ -	10	34	7	5	1	1	...	58	93
14th July, -	2	9	1	1	...	...	...	13	68
28th „ -	5	18	...	2	...	...	...	25	49
11th August, -	2	18	1	1	1	...	...	23	55
25th „ -	...	3	...	...	...	...	...	3	29
8th September,	2	11	...	...	...	2	...	15	30
22nd „ -	1	6	...	3	...	1	...	11	23
6th October, -	2	9	...	...	...	...	...	11	26
*20th „ -	2	4	1	11	1	...	...	19	36
3rd November,	2	2	...	3	1	...	...	8	23
17th „ -	1	4	...	...	1	...	...	6	22
1st December, -	...	17	...	1	3	...	...	21	33
15th „ -	9	18	...	1	8	...	...	36	58
29th „ -	8	18	...	3	5	1	1	36	75
TOTAL, -	83	216	26	41	23	7	1	397	...

* Nine of the cases in the Southern District here were employees in a wire factory in the district, and 1 in the Central was a trade canvasser, whose occupation led him to visit the works daily.

TABLE II.—EPIDEMIC PERIOD.—CASES REPORTED IN SEVERAL FORTNIGHTS, 1901.

Fortnight ending	Central.	East.	North.	South.	West.	S.-S.	N.-W.	Whole City.	No. in Hospital.
12th January, -	6	15	...	1	1	...	...	23	63
26th „ -	14	256	6	53	2	17	2	350	377
9th February, -	20	104	22	37	4	14	1	202	436
23rd „ -	20	67	11	17	2	7	3	127	368
9th March, -	30	219	18	26	2	3	1	299	435
23rd „ -	16	109	12	16	4	3	1	161	373
6th April, -	15	35	16	11	10	3	2	92	234
20th „ -	10	28	8	19	2	...	...	67	155
4th May, -	3	10	6	7	1	1	...	28	102
18th „ -	2	12	...	3	1	...	...	18	55
1st June, -	3	5	...	3	...	...	...	11	35
15th „ -	...	2	...	...	...	...	...	2	15
29th „ -	...	1	1	6	...	...	...	8	11
13th July, -	...	...	...	1	...	...	...	1	3
TOTAL, -	139	863	100	200	29	48	10	1,389	...

TABLE III.—RECRUDESCENCE, 1901-2.—CASES REPORTED IN THE SEVERAL FORTNIGHTS.

Fortnight ending	Central.	East.	North.	South.	West.	S.-S.	N.-W.	Total.	No. in Hospital.
16th November,	...	...	1	...	...	...	...	1	1
30th „	...	...	5	...	...	...	...	5	6
14th December,	...	...	3	1	...	...	...	4	7
28th „	...	...	...	...	...	...	...	...	7
11th January, -	2	1	24	...	...	...	1	28	33
25th „ -	4	3	13	2	1	...	...	23	55
8th February, -	3	4	13	3	...	...	...	23	50
22nd „ -	12	102	14	7	3	2	7	147	169
8th March, -	13	39	12	11	13	1	3	92	202
22nd „ -	6	32	14	25	1	3	4	85	104
5th April, -	5	15	2	11	2	1	...	36	105
19th „ -	3	6	2	1	2	1	...	15	71
3rd May, -	...	3	...	4	2	1	...	10	37
TOTAL, -	48	205	103	65	24	9	15	469	...

CONDITIONS INFLUENCING EARLY SPREAD OF INFECTION.

The circumstances under which the first case occurred were exceptionally fitted for the dissemination of infection, and, as we have seen, cases were occurring before the end of April which were not traceably related to any known source.

This experience was frequently repeated, and independent foci of infection were established before the summer of 1900 had well advanced. Associated cases not infrequently occurred—grouped at one time in the neighbourhood of the residence, at another among the fellow-employees of some one whose illness had escaped recognition at the time of its occurrence. Mildness in type of the original attack not infrequently explained these groupings, the first illness being sometimes regarded as Chickenpox, or as a “bilious” affection, while in others it had not come under observation at all until the secondary attacks developed; but evidence of communication between the groups was not always, or indeed often, forthcoming, especially after the first weeks had passed.

It has already been indicated that the disease was unequally distributed throughout the City, and it will be well to indicate some details of its dissemination during the pre-epidemic period, so that we may be better able to consider whether new forces came into operation to determine its epidemic prevalence at a later period, and, if so, what they were.

PRE-EPIDEMIC PERIOD.

Until the end of June, 1900, the numbers sickening increased steadily, but gave way during the autumn months, which were characterised rather by a persistent recurrence of the disease than by the actual numbers sickening. Chiefly, however, in the early period of increasing prevalence, a notable alteration in the distribution of the cases occurred, so that the districts invaded between April and the end of May may be contrasted with those invaded in subsequent weeks. For this purpose, on Map I. the localities in which cases were recorded in each of the fortnights ending 21st April, 5th May, 19th May, and 2nd June are distinctively marked in black, blue, and green dots respectively, and such details of their association with each other as were at the time discoverable, and are now necessary to enable their distribution to be followed, are transcribed from the reports of the several fortnights.

The invasion is thus described in the report to the Health Committee for the fortnight ending 21st April, 1900:—

For the first time since the early winter of 1897,* indigenous cases of Smallpox have occurred, and the attendant circumstances create some apprehension as to the future spread of the disease. On 10th April I was asked to see a case of illness by the medical attendant of a man residing at 3 Tobago Street, and on visiting I found him suffering from Confluent Smallpox, the symptoms indicating that his attack was well advanced towards the end of the second week. He had not been brought under medical observation until the day preceding my visit.

The man had been a seaman on board the s.s. *Hispania*, which arrived in Glasgow on 18th March, from Bombay *via* Liverpool. I had been advised by the Medical Officer

* On 5th June, 1899, there was admitted to Hospital, suffering from Smallpox, a patient from the Northern District of the City, who had arrived in Glasgow on 23rd May from India, coming overland from Marseilles, at which port he arrived on 20th ultimo. His sickness began on 1st June, which would coincide with exposure to infection about the time of his arrival at Marseilles. There was no recognised case of Smallpox among the passengers or crew of the steamer in which he came from India.

of Liverpool of the occurrence of Smallpox on board this vessel while at that port, and, in consequence, had the crew kept under observation during the time she lay in port here, *i.e.*, from 18th to 21st March. This patient was re-vaccinated* at Liverpool with the rest of the crew, and it had been reported to me that this had been successful, and that the patient had sailed with the ship on the 21st. Such, indeed, seems to have been his intention, as he had signed articles for the outgoing voyage, but had failed to join the ship, and his illness began towards the end of March. After his death no evidence of re-vaccination could be discovered.

It is a considerable time since any tenement in Glasgow has been exposed to such concentrated and continued infection as has occurred here, and the events which follow are of more than usual interest. Up till the present time (23rd April) eleven sicknesses have been discovered as the result of this man's illness. All of them, except the doctor who attended him and a pawnbroker's assistant who received articles in pledge from his household, are residents on the same stair in which the patient lived. Three of the cases occurred in the first patient's household—the two others being his wife and a female lodger—that is, all the inmates thereof. Three others occurred in a house on the top flat. The others—an unvaccinated child (who has since died) and its mother—were visitors to the first patient's house, and there are two single cases in separate households. In all, five households have been invaded, and four out of the five have been occupied in excess of their legal number. In the first patient's, for instance, three adults were found in one apartment ticketed for two, while two other houses, each ticketed for two, and one house ticketed for two and a-half, were each occupied by three adults and three children. Further illustration of the social habits of the family first attacked is afforded by the inclusion of the pawnbroker's assistant among the victims.

Tobago Street, where the first patient resided, is in Sub-District No. 11, and the invaded tenement is marked on Map I. with a circle enclosing a black dot.

In the next fortnight, ending 5th May, six of the recorded cases occurred in the Central District, and all were traceably associated with Tobago Street, although at the time of their discovery some were resident elsewhere.

In the Eastern District seven cases were registered, and some details of their association, and of the migratory character of some of the patients, are given in the subjoined extract:—

During the fortnight ending Saturday, 5th May, 13 cases of Smallpox were registered, making 22 in all from the beginning of the outbreak. 12 of these occurred in the first week of the fortnight, and 1 in the second. The connection of two of these occurring in the first week with the first case was noted in the report for last fortnight, and the following details have reference to the remaining 11 registered during the present one. 3 of the attacks developing in the first week involved three separate families residing at 3 Tobago Street, and occurred in persons under observation, while a fourth, nominally a tenant at this address, spent occasional nights in a Common Lodging-house, and had slept in one on the night preceding his discovery. A fifth case was discovered, through information gleaned from neighbours, in the person of a girl residing at 16 Kirk Street, Calton, who had been a visitor at infected houses in Tobago Street, but whose name had not been communicated at the time when the earlier infections were discovered. She was ten days ill when removed to Hospital. The sixth case was a woman who presented herself at the Central Dispensary for treatment. She had been resident at 3 Tobago Street during part of the illness of the first patient, but had left before the nature of his illness was recognised, and in the interval had changed

* Much correspondence resulted from this statement, and considerable use has been made of it by opponents of vaccination, who omit to notice the further statement in the report that no evidence of re-vaccination was discoverable after death. Several months after the incident was thus recorded the ship surgeon of the *Hispania* during this voyage returned to Glasgow, and it was then learned that the re-vaccination referred to in the minute had been performed, but unsuccessfully, during the voyage from India, in the month of February preceding, because of the occurrence of Smallpox on board, and that the operation had not been repeated on the occurrence of subsequent cases.

her abode—first to a friend's house in 34 Kent Street, leaving this to spend three or four nights (17th or 18th to 21st April) in the Moncur Street Model Lodging-house before taking a room at 139 Stockwell, in which she resided when her illness was brought to light. Case No. 7 occurred at 69 Main Street, Bridgeton, in the person of a rag-store worker, employed along with two residents at 3 Tobago Street, one of these being a lodger in the original patient's house, and now also in Hospital with the disease. The remaining four cases were in members of one family in Preston Street, Bridgeton, whose association with the Tobago Street centre cannot be directly traced. *They furnish the only exception in the history of direct association with 3 Tobago Street,* but, taken together with the incidents just recorded, they indicate that the source of infection has now spread beyond the original centre, and the keepers of Model Lodging-houses have been advised to be on the outlook for the disease among their patrons.

It is to be observed here that as early as the second fortnight evidence that the sources of infection were being widely distributed was supplied by the Dispensary patient, the rag-store worker, and the frequenter of the Common Lodging-house; while the illnesses in the Preston Street family, which began with the sickening of the mother on the 20th of April, after a period of confinement to the house for at least four weeks, brought her probable date of exposure to infection back to within a day or so of the time (10th April) when the first case was recognised.

The following fortnights, ending 19th May and 2nd June, showed an extension of the disease into the North, South, West, and South-Suburban areas; and as this latter fortnight brought one phase of the outbreak to a close, the details may be followed in the report of the period.

(Extract from Report for Fortnight ending 19th May.)

During the first week of the present fortnight 9, and in the second week 12 persons were admitted to Hospital suffering from Smallpox. This is an increase of 8 on the number registered during the previous fortnight, and while 5 of the cases occurring within the first week were in persons under observation in consequence of their association with one or other of the cases referred to in last report, none of those occurring during the second week belong to this category. Of these latter, however, one was supplied by a woman residing in Gallowgate, who had attended the Central Dispensary along with the patient noted in last report, and whose name we were in possession of, but whose address could not be ascertained, while another case arose in direct association with this one.

Of the cases not thus accounted for, 2 occurred in the Eastern, 9 in the Northern, 1 in the Central, and 1 in the Western District of the City—a sufficient indication that the sources of infection have now, as was anticipated from the facts which came to light in connection with the cases occurring during the previous fortnight, extended beyond the limits of the originally infected area. This is specially evident from the distribution of the disease in the Northern District of the City. The earlier cases occurring therein suggested contact during the hours of employment with some unrecognised case, and this impression was strengthened by the knowledge that several fellow-workmen had their residence in the neighbourhood originally infected; but the later cases had no such association, although the dates of sickening in all of them coincided with exposure to infection in the latter half of April. Indeed, the details of one of those later cases may be cited, because they illustrate the risks of infection to which the public are presently exposed, as well as the difficulty which attends the effort to bring particular attacks into direct connection with earlier cases. The patient in question is in the service of the Corporation as an attendant at one of the places of popular resort much patronised during the intervals of labour. He sickened on 7th May, but was able to attend to his duties till the evening of the 12th, by which time the eruption was at least two days old. As this latter date was a Saturday afternoon, quite an

indiscriminate exposure to infection must have occurred to a large number of persons, the result of which there is presently no means of estimating; but the incident will lend emphasis to the recommendation that, in the present distribution of the disease among the community, successful re-vaccination should be accepted as the only efficient means of acquiring protection from accidental exposure to infection.

Again, in the fortnight ending 2nd June, it is noted—

In the North-Western District alone has no case hitherto occurred. As in past outbreaks, we are again finding that one of the greatest obstacles to effectively coping with the disease is the occurrence of an extremely mild and modified form, which escapes recognition until, as a result, secondary cases of a graver nature arise. The history of these milder cases is strikingly uniform, and it may help towards a recognition of this form of the disease to briefly outline it here. In the majority of such cases medical advice is not sought; indeed, there may be said to be no definite illness—merely indisposition for a day or two, some little derangement of appetite, and then a few spots, of the appearance of pimples, on the face, body, or limbs. With the appearance of these spots the symptoms of indisposition pass off, and the patient is confirmed in his impression that the attack is a “bilious” one. The subsequent history of an example of this may be related at length, in the order in which the events came to knowledge. An employee of the Lighting Department was removed to Hospital with a well-marked and severe attack of the disease. During the investigation it was ascertained that a fellow-employee working at the same desk had suffered from a pimply eruption of the character already indicated, but was absent from work in consequence thereof only a day and a-half. On examining this latter a few stains only were found, two at least of which created an impression that they had been produced by Smallpox. By way of testing this impression he was re-vaccinated (unsuccessfully, as was afterwards found), and instructions were given to disinfect his house. On proceeding to carry out this, however, his wife was found actively employed in domestic duties with a quite recognisable, but very much modified, eruption of Smallpox, about three days old.

Of a different, but equally suggestive, character is the association of seven cases occurring near the junction of High Street and Duke Street. Proximity in residence here led to a comparison of dates of sickening, and these coincided so closely that a common source of infection was suggested. The information obtained pointed to a common acquaintanceship of the patients with the household of an eating-house keeper in the neighbourhood, whose wife, it was then learned, had died after some short-lived symptoms of acute illness on the night of 13th or early morning of 14th May. She had been a chronic sufferer from a skin eruption, which renders obscure the description of her last illness as told by friends, and there was no medical attendant. Hæmorrhagic Smallpox, however, was suggested by some of the particulars gathered, but, without being able now to verify this impression, the practical value of the incident lies in the discovery during this investigation that a daughter of this household was then recovering from an attack of the disease so mild that not more than half-a-dozen spots could be detected.

One case admitted during the fortnight affords quite a striking, although negative, illustration of the protective value of re-vaccination. On 14th May a patient was removed to Hospital from a tenement in the Northern District, seven days ill of the disease, and on the same day each household in the tenement was advised to accept re-vaccination of its adult members. All the tenants had this operation performed save one woman, who sickened on 23rd May, and is now in Hospital with the disease, her husband, who was re-vaccinated, escaping.

With a vivid recollection of the extensive re-vaccination carried out in the Model Lodging-houses and Prisons in quite recent years, it is of considerable interest to note that, although up till the present three Models have had opportunities of “catching fire,” so to speak, from the occasional residence therein of persons in daily intercourse with houses in which Smallpox was present (in one case, indeed, a patient had already slept for one night in a Model with the eruption upon him), nothing has as yet occurred to indicate their successful invasion.

With regard to the immediate future, everything points to a period of considerable anxiety. It cannot be too strongly impressed on the community that our present knowledge of the distribution of the disease renders it a question of simple prudence for each to protect himself from risk by re-vaccination. The disease is no longer confined to the earlier associates of the neighbourhood of its origin. One of the most recent cases occurred in Pollokshields (District 25).

We have now reached the period when a definite invasion of the Eastern District occurred. In the following tabulation the district distribution of all the cases recorded in three successive periods ending 2nd, 16th, and 30th June (including in that ending 2nd June all the cases known to have occurred from the beginning of the outbreak) are given:—

Period ending.	Central.	East.	North.	South.	West.	S.-S.	N.-W.	Total.
2nd June, - - -	33	18	14	3	2	2	...	72
16th „ - - -	4	27	2	7	...	...	...	40
30th „ - - -	10	34	7	5	1	1	...	58

Of the 9 cases recorded in the Eastern District till the end of the fortnight ending 19th May, 4, as has been said, formed a detached group in Preston Street, and 3 others could be referred to an association with Tobago Street. Up till the occurrence of those now to be considered, there were only 2 others (in the fortnight ending 5th May), one of whom (residing in William Street, Bridgeton) had a similar association, but the other (residing in Montgomery Street) was untraced.

It will lend greater precision here to take the dates of sickening in preference to the period of notifications, and in the Map II. the eastern cases only which sickened in the fortnights ending 2nd, 16th, and 30th June are indicated, by black, blue, and green dots respectively. In the several fortnights these numbered 16, 29, and 22, and had the following distribution:—In the fortnight ending 2nd June a grouping occurs round Steven Parade, immediately to the west of the Hospital; two are situated in the neighbourhood of Dechmont Street, to the north; and several are more widely distributed, especially towards the lower end of Springfield Road, Baltic Street, and Boden Street. In the fortnight ending 16th June a more definite grouping occurs in the neighbourhood of Baltic Street, and generally in a south-westerly direction from the Hospital; while in the fortnight ending 30th June there occurred a congeries of cases round a tenement in London Road, under the following circumstances:—

(Extract from Report for Fortnight ending 30th June, 1900.)

The most striking incident in the history of the disease during the fortnight was occasioned through the notification of a case in a tenement in London Road, and the subsequent discovery, as a result of house-to-house visitation, that for about two weeks the disease had been present in another household in this tenement, and that several others had subsequently been invaded, in addition to the one in which the notified case occurred. The patient whose attack stands related to all these others as the source from which their infection was derived was a girl who, when discovered, was in an advanced stage of the disease—progressing, in fact, towards recovery, but still in a highly-infectious condition. Her illness had been a moderately severe one, as judged by the crusting present on discovery, but she had no medical attendance, and

intercourse between the members of her household and the community was unrestricted. Smallpox infection takes full advantage of the opportunities thus offered for spreading, and a record of the cases presently known to have resulted from this one is instructive. House-to-house visitation of the tenement resulted in the discovery of eleven cases in seven households, and there has since been notified or discovered a neighbouring shop-keeper doing business with the tenants of this land; a fellow-worker with a member of the originally infected household; three visitors to the tenement, one of whom resides in the Eastern and two in the Northern Districts of the City—all of which can be relegated to infection derived from this source.

In addition to these 16 cases, 10 others occurred in the Eastern District who were associated with each other, or with cases in the previous fortnight, and there were 6 others for whom no such association could be discovered.

In the other districts of the City, 9 occurred in the Central, 6 being associated cases; 7 in the Northern District, only 1 of which had no traceable association with the others; and 5 in the Southern, 4 of which had a traceable connection. The South-Suburban District and the Western had each 1 case. In all 58 cases were registered, against 40 for the previous fortnight; but it may be observed, as affording some ground for satisfaction, that the majority are coming under notice earlier in the illness than formerly, and the chances of secondary infections from them are, in consequence, considerably lessened.

OCCUPATIONAL INCIDENCE.

The occupational incidence of the attacks so far serves only to indicate the wide distribution of the disease among the industrial population, without presenting any contrast between the occupations of those attacked before and after the beginning of June. Prior to 2nd June 41 were males and 57 females. During June there were 37 males and 35 females.

During July and August the numbers sickening considerably diminished; gradual dissemination through unrecognised mild attacks of the disease took place; and the difficulty of stimulating popular interest regarding the probable nature of illnesses, however mild, when accompanied by eruption, was again proving an obstacle to the early recognition of cases.

An enquiry with regard to the probable sources of infection of 48 cases recorded during the four weeks ending 11th August showed that in 14 cases only could this be ascertained:—

Fortnight, 28th July.	Fortnight, 11th August.		
5	9	...	Associated with previous cases.
13	10	...	Occurring in infected neighbourhoods.
7	4	...	No definite association with known sources.

Renewed activity began towards the end of November. In the fortnight ending 1st December, 21 cases had been reported, and in each of these ending 15th and 29th, 36 cases, the numbers contributed by the Eastern Districts being respectively 17 in the first and 18 in each of the later fortnights.

In Map III. the distribution of the cases occurring in each of these fortnights is distinctively marked, and it will be seen that while those occurring in the fortnight ending 1st December are widely distributed over Districts 5, 7, and 8, there is a definite grouping in the next fortnight in one part of No. 5, and in the second fortnight in District No. 7, towards Nuneaton Street, and again at the foot of Springfield Road.

The following incident in connection with a threatened invasion of the City Poorhouse which occurred at this time is worthy of note:—

CITY POORHOUSE.

Early in December two cases were simultaneously recognised among inmates of the City Poorhouse, one of whom had been resident from the previous September, while the other had been admitted only three days previously, his sickness having begun two days before that. They were in separate wards, and the suspicion created by the indigenous case that infection had been introduced either by a modified and not recognised attack or through visitors was confirmed on the following days by the occurrence of other cases. The dates of sickening were as follows:—5th, 7th, 12th, 13th, and 14th December; while, as has already been said, another inmate, admitted on the 6th of December, had already sickened on the 4th.

On the Poor Law Authorities becoming aware of the gravity of the outlook, the services of the whole medical staff were called into requisition for the purpose of re-vaccinating both inmates and applicants for relief, and it was subsequently reported to the Health Committee that in the City Poorhouse 1,610 and in Barnhill 360 inmates, and 551 applicants, had been re-vaccinated.

The result of this vigorous action by the Poor Law Authorities was that no subsequent cases occurred among the inmates until the following winter, when the *personnel* had considerably changed.

EPIDEMIC PERIOD.

By this time we had reached the beginning of the epidemic period of the outbreak, to which the following extracts refer:—

(Extract from Report for Fortnight ending 12th January, 1901.)

During the fortnight 16 cases of Smallpox occurred in the Eastern District, 6 in the Central, and 1 in each of the Southern and Western Districts—a total of 24, against 36 in the preceding fortnight. Notwithstanding this reduction in the number of cases registered, the outlook is not reassuring, and the approaching months are likely to see a still further extension of the disease. Among the causes for apprehension is the indifference with which the milder forms of the disease are being regarded. The following is an illustration:—On New-Year's Day a case of suspected Smallpox was reported from Commerce Street, and the patient, on being visited, was found to have been only a fortnight in Glasgow, and for the most of that time to have lodged with a family in Argyle Street, where he had sickened on 28th December, and, in consequence, had been removed to a friend's house in Commerce Street. Coincident with this case being recognised, a telegram was received from the Medical Officer of Health, Aberdeen, stating that a case of the disease had developed there in the person of a man who had also been a lodger in the Argyle Street house, but had gone home for the holiday season. Enquiry at this house resulted in the discovery that one of the inmates, a girl, was still suffering from an attack of much modified Smallpox, but had recovered sufficiently to admit of her returning to work, in a tea-room in the City, for the last week of the year. It was further found that a younger sister had sickened of a still milder form of the disease a fortnight earlier—that is, in the end of November—so that for five weeks previous to the New Year this house had been in an infectious condition, while the inmates were pursuing their usual avocations. Neither patient had been under medical treatment. This incident occurred in a house of six apartments, inhabited by a family of eight persons, in addition to which there were seven lodgers, four of whom were still in residence, and three had either removed or were on holiday—one being at an unknown address in Morayshire when he sickened of the disease, but returned to Glasgow before its nature was recognised. On the circumstances being brought to the notice of the management of the tea-room in question, twenty-three members of the staff were re-vaccinated, and the period of incubation has now passed without any sickening among them having occurred. Seven cases in all, however, arising out of direct association with the household, have, up till the present, been discovered. One of these, a visitor, residing at Great Hamilton Street, afforded an excellent illustration

of how a mild form of the disease may give rise to a more severe form in a person not protected by vaccination. The patient in this instance had visited several times during the currency of the disease at Argyle Street, and on 28th December sickened; she was unvaccinated, and her attack became confluent.

The indifference to effective re-vaccination on the part of the general population is much to be regretted in the present position of Smallpox in the City. In connection with the cases reported during the fortnight, 599 persons were re-vaccinated in the tenements where the cases occurred, or in the workplaces in which they were employed, but 19 only of the general public took advantage of the opportunity of free vaccination offered by the Health Committee through medical practitioners. Smallpox is at present widely distributed, and the temporary inconvenience which re-vaccination gives rise to is a trifling consideration to place against the absolute protection from the disease which it ensures. District visiting and the work of the various philanthropic and charitable organisations of the City can only be conducted with safety at the present time by those who are fully protected by vaccination, and we must look for a large extension of the disease in our midst unless voluntary effort is made by every section of the community to obtain the protection which re-vaccination affords.

(Extract from Report for Fortnight ending 26th January, 1901.)

During the fortnight 350 cases of Smallpox were registered, and the resources of the administration have been taxed to a degree quite unknown in recent years.

In the Eastern District alone 256 of these cases occurred; in the South and South-Suburban there were 70; in the Central, 14; in the Northern, 6; while the Western and North-Western Districts have each 2 cases.

In the Eastern District the majority of the cases have occurred in certain well-defined groupings, which constitute infected areas within which the disease has assumed epidemic virulence, and in the Southern District a similar tendency is likewise manifest, although in a more limited form at present.

The areas in the Eastern District in which this has occurred are—

- (1) Parkhead generally, but with a tendency towards aggregation at the upper end of Dalmarnock Street and streets adjacent thereto, in Westmuir Street and in the streets adjoining, and in the line of Great Eastern Road towards the eastern boundary of the City.
- (2) London Road and streets east of Bridgeton Cross, and again beyond its junction with Springfield Road.
- (3) Dalmarnock Road.
- (4) Springfield Road.
- (5) Main Street, Bridgeton.

In the Southern District the area lies between Caledonia Road and the River, and extends eastward in the direction of Oatlands, while sporadic cases have occurred in Crosshill, Langside, and Mount Florida.

The rapid extension of the disease in this form requires the concurrence of two factors, which may be thus stated—the free movement of mild and unrecognised cases, and a population largely susceptible to the disease from inefficient vaccination. A comparison of the dates of sickening in a very striking manner demonstrates the circumstances under which this took place.

I have been able to ascertain those dates in 306 of the cases registered, and reproduce them here—

Dates of Sickening.			Numbers Sickening.	Dates of Sickening.			Numbers Sickening.
				<i>Brought forward,</i>			39
December	28th,	...	—	January	12th,	...	7
	29th,	...	1		13th,	...	24
	30th,	...	1		14th,	...	22
	31st,	...	—		15th,	...	26
January	1st,	...	1		16th,	...	32
	2nd,	...	—		17th,	...	43
	3rd,	...	—		18th,	...	40
	4th,	...	1		19th,	...	30
	5th,	...	—		20th,	...	23
	6th,	...	—		21st,	...	16
	7th,	...	—		22nd,	...	5
	8th,	...	3		23rd,	...	1
	9th,	...	7		24th,	...	—
	10th,	...	15		25th,	...	—
	11th,	...	10		26th,	...	—
							—
<i>Carry forward,</i>			39				308.

Dealing, in the first place, with the days on which the number sickening was greatest, we have a period, extending from the 13th to the 21st January, in which 256 persons were attacked, and the scale of attacks rises towards the 17th, when 43 persons sickened.

The period of incubation of Smallpox varies from the ninth to the seventeenth day after exposure, the majority sickening about the twelfth day. The 17th of January would therefore correspond to exposure to infection on the Saturday of the New Year holidays (5th January).

By the 7th of January most persons had returned to their ordinary occupation, and the rapid decline in the sickenings occurring in the third week of the year is quite as striking as the rapidity of the increase, which began more than a week earlier.

This analysis might be pushed somewhat further into an explanation of the number sickening between the 8th and 12th, fifteen persons having sickened on 10th January, which again corresponds with an exposure at the end of Christmas week, when many of the observances of the season had in part commenced.

The outbreak is, therefore, definitely related to exposure to infection occurring during the holiday season.

The localities involved correspond very closely, it will have been seen, with those in which isolated cases of the disease were known to have been occurring for some considerable time past; in these districts, therefore, there has been a succession of cases quite unrecognised owing to their mildness, but gradually, from their numbers, acquiring an explosive intensity which only required a suitable occasion to show itself. This came with the holiday season, when intimate co-mingling occurred, and the mild cases had for the time being a newly-established relationship. That this has proved to be a susceptible one almost beyond belief brings home most forcibly the need for statutory re-vaccination if communities are to be protected from recurring outbursts of the disease at intervals of years.

In June last the Health Committee, in view of the then distribution of Smallpox, recommended the population to have recourse to re-vaccination, and, by way of placing at the disposal of every one who was unable to pay for the operation an opportunity of having it done, a fee was paid to practitioners for all such operations performed by them. The result of this appeal was extremely disappointing, and even under conditions of direct exposure to infection we not unseldom found that an offer of re-vaccination was refused. Several of these, it must be added, are now in Hospital with Smallpox, and in two instances at least death has occurred.

At the present moment the numbers before us indicate that the rush of cases created by the holiday period has passed, but a secondary rise is likely to occur at a period corresponding to infection on the 17th, which is the day on which the maximum amount of infection is known to have been present among the population. The present

lull in the occurrence of cases is, therefore, not to be taken to indicate that the danger is past.

It may be interesting at the present time to point to the complete exemption from the disease enjoyed by the Post Office service. The members of this service, probably more than any other in the community, are brought into quite definite relationship with every infected area, and yet no case of sickness has occurred among them. It is a condition of this service that each member be efficiently re-vaccinated.

In the four weeks which followed a steady decrease occurred in the numbers registered fortnightly, but this was again followed by an increasing prevalence, indicated first by the number of admissions to Hospital in the last week of February, which collectively did not equal that which we have just seen, but extended throughout a period of three weeks, and, in consequence, created greater public apprehension than the larger volume of the earlier rise.

(Extract from Report for Fortnight ending 9th March, 1901.)

The cases of Smallpox registered during the fortnight numbered 299, and their distribution over the several districts is shown in the following Table, the numbers for the three preceding fortnights being given for comparison—

	26th Jan.	Fortnight ending		9th March.
		9th Feb.	23rd Feb.	
Eastern, - - - -	256	104	67	219
Central, - - - -	14	20	20	30
Northern, - - - -	6	22	11	18
Southern, - - - -	53	37	17	26
Western, - - - -	2	4	2	2
South-Suburban, - - - -	17	14	7	3
North-Western, - - - -	2	1	3	1
	<u>350</u>	<u>202</u>	<u>127</u>	<u>299</u>

After an interval of diminishing prevalence of the disease, extending from 1st to 19th February, an increase again began, which was first indicated in the number admitted to Hospital on 23rd February. The recrudescence in the Eastern, Central, Northern, and Southern Districts may be stated as an increase of 155 per cent. on the numbers registered during the previous fortnight, but varying from 227 per cent. in the Eastern to 50 per cent. in the Central District. In relation to population, there were 13 attacks per 10,000 living in the Eastern District, less than 3 in a similar number in the Central District, 2 in the Southern, and 1 in the Northern.

The occurrence of this increase after an interval which is longer than the maximum period of incubation displaces it from the swing of epidemic movement which marked 17th January and 1st February. When the increase in January occurred there was a definite time relationship between the period of sickening and the preceding holiday season. No incident of a similar character occurred by which the rapid increase in the numbers sickening from 19th February may be accounted for. A comparison of the dates of sickening of these latter cases points to the end of the first week of February as a period when an active dissemination of the disease took place. It was at the end of this week that the daily number of patients under treatment was at its greatest, a fact which undoubtedly suggests the introduction of a new factor, the operation of which was most probably intensified by the seasonal conditions under which it occurred.

In the fortnight ending 23rd March 161 cases were registered, and thereafter the outbreak rapidly declined. In the two periods of greatest prevalence just referred to the following numbers were registered:—

Fortnight ending			
26th January,	9th February,	9th March,	23rd March,
350	202	299	161
<u>550</u>		<u>460</u>	

PERIOD OF RECRUDESCENCE.

The history of this may be shortly told. The disease first reappeared in the Northern District of the City, and, in contrast with what had occurred during the greater prevalence earlier in the year, certain Model Lodging-houses were now invaded, owing to the unrecognised presence of cases of an exceptionally mild type in one of them during December.

In the early weeks of the recurrence the cases were chiefly drawn from the Northern District, but in the fortnight ending 22nd February, of a total of 147 new cases occurring throughout the City, 102 occurred in the Eastern District, and the distribution generally reverted to the lines it had followed earlier in the year. The following extracts contain a description of the principal features which it presented :—

(Extract from Report for Fortnight ending 16th November, 1901.)

The first case of Smallpox which is known to have occurred in the City since 29th June last was admitted to Hospital on 6th current. The patient is a spirit salesman, employed in the Northern District, and also residing there. He sickened on 31st October, leaving work on the following day, but his illness was believed to be Measles until 6th November current, when some doubt as to its nature arose, and we were informed thereof. Patient occupied a house of two apartments; his family includes his wife and two young children, and there were three male lodgers. He had not been re-vaccinated in spring, while in his wife and one lodger the operation was then unsuccessful. Two possible explanations of the source of infection offer themselves, but in the absence of all trace of illness among his intimates, the possibility of his obtaining it through any channel of missed infection remaining from the outbreak in spring is less probable than that it has reached him through one suffering from a mild attack of the disease. It is consistent with all that is known of the conditions determining the incidence of Smallpox that a recurrence of the disease in dissociated centres is now to be expected, that our present case is only the first illustration that mild and unrecognised cases most probably already exist, and that, in consequence, the occurrence of subsequent disconnected cases is to be anticipated as the winter advances. All the known contacts have been placed under supervision, the household being removed to the Reception House, where those formerly unsuccessfully re-vaccinated have since been done.

In this and the adjoining tenement 50 out of 76 persons over five years of age had been re-vaccinated in spring. Two only of those remaining could be persuaded to take advantage of the offer of re-vaccination again made on the occurrence of the present case. The census showed that the number of persons over five years of age within the municipal area exceeded 670,000. The total number of recorded re-vaccinations among these amounts to slightly over 400,000.

(Extract from Report for Fortnight ending 30th November, 1901.)

During the fortnight 5 cases of Smallpox were registered, as against 1 in the preceding fortnight. The first of these five was reported on 20th November, having sickened on 14th November, while resident in a Model Lodging-house in the neighbourhood of Garscube Road. The source of this patient's infection was not ascertained until 26th November, when a second case (M.), residing in 202 Possil Road, was notified. Here the patient had sickened on 20th November, and, on enquiry, a third case (C.), a neighbour, was found to have sickened on 21st, and a fourth (J. K.) on 14th November. All of these are secondary to an attack in a fifth (K. D.), whose illness began on 31st October, and who had almost recovered by the time the other cases came to be investigated. There is a close correspondence between the beginning of this last patient's illness and that of the patient reported last fortnight. Both sickened on 31st October, but otherwise they appear to have nothing in common. None of the six cases in Hospital had been re-vaccinated.

In the tenements in the immediate vicinity of the infected one at Possil Road, it has been found that during the vaccination last spring 279 persons out of 413 persons

living over five years of age, or 67 per cent., were re-vaccinated, and this has been raised to 84 per cent. as the result of the present cases.

Since May last, however, re-vaccination has practically ceased among the general public.

(Extract from Report for Fortnight ending 14th December, 1901.)

The cases of Smallpox known to have occurred during the fortnight were four in number. One attack was due to infection contracted in London, two were associated with the cases reported last fortnight occurring at 202 Possil Road, and the fourth case occurred in Springburn, and had no discoverable connection with any other.

In the first case patient arrived on 29th November from Tilbury, and sickened on the following day, the rash appearing on 2nd December. The family which this patient was visiting in Glasgow consisted of five adults, three of whom had been re-vaccinated last winter.

The cases occurring in association with Possil Road are—

1. R. G., residing at Rodney Street, sickened on 1st December, the eruption appearing on the 4th. Patient had friends at 202 Possil Road, and was a frequent visitor there. Although she appears not to have visited after 18th November, she was visited subsequently at her own house by persons from that address.

2. Mrs. P., residing at 210 Possil Road. 210 is the front land to which those tenements entered from 202 from the back building. The husband of this patient is employed in connection with some alterations being carried out in the houses in which former cases of Smallpox had occurred, and he himself had been re-vaccinated.

The Springburn case sickened on 2nd December, the eruption appearing on the 4th. This patient had no vaccination mark, and says she understands she never was vaccinated.

(Extract from Report for Fortnight ending 11th January, 1902.)

In the first week of the fortnight twenty-three cases of Smallpox were admitted to Hospital, in the second week five cases.

These, with two exceptions, occurred in persons who, at the time they contracted the disease, were inmates of, or visitors at, a Model in the Northern District, and they afford another illustration of what will happen when a mild case is permitted to live among persons who are only partially protected by vaccination. This Model had been under observation during November, and, although an interval of freedom from infection occurred between the case then removed and the first of the present series, we may regard them as at least indirectly associated.

The outbreak was brought under notice in the following circumstances:—On 30th December the Local Authority of Ayr intimated that a man who had lived in this Model between the 7th and 11th of December had sickened in Ayr on the 22nd, and, while enquiry was being made into this, another inmate applied for parochial relief, and was recognised to be suffering from the disease.

The enquiry in the Model had already led to the discovery of two other cases; subsequently a man was discovered whose eruption went back to 6th December. Directly associated with this man are twenty others resident in the Model, one being the Superintendent, who had, on the occasion of the case in November, assured us that he had been re-vaccinated last April, and only admitted the error of his statement when his attack declared itself; two living in Models elsewhere; a bedmaker in the Model, but living in M'Adam's Lane; one in Possil Road and one in Bernard Street, in the Eastern District, both of whom were occasional visitors to the Model in question. On the recognition of the outbreak the owner was informed that he must cease admitting new inmates, and a circular was addressed to the keepers of all Model Lodging-houses advising them of the occurrence, and inviting their co-operation in the discovery of suspected illness. The affected Model is under nightly medical examination.

In this Model 143 persons were re-vaccinated, and of 83 examined within the fortnight 44 had proved successful and 39 unsuccessful.

In addition to these twenty-six, two other cases occurred during the fortnight, one in St. Vincent Lane and one in a Model in the Eastern part of the City, and neither, so far as is known, has any association with the group in the Northern District. With

regard to one of the admissions, a male patient, aged thirty-three years, named W. B., it falls to be observed that he says he was successfully re-vaccinated three years ago in one of the Models, and that two marks exist. This is a further illustration of what has already been said in connection with the cases occurring last year.

(Extract from Report for Fortnight ending 25th January, 1902.)

During the fortnight 23 cases of Smallpox occurred, as against 28 in the preceding fortnight. Of these, 6 were removed from the Model Lodging-house in the Northern District referred to formerly; 4 were removed from other districts, but had been resident in the Model at the time of contracting the disease; 6 were indirectly associated therewith; and 7 had no traceable association. Of those contracting the disease in the Home, one had, prior to sickening, gone to reside in the Western District; a second sickened in the Model late in December, but had gone soon thereafter to reside with a friend in Possilpark, and his illness was only recognised when his friend developed the disease; a third was admitted to the City Poorhouse, also late in December, and thereafter developed the disease in so mild a form that its nature was not recognised until a second inmate sickened; and a fourth was known to have been present with a Smallpox patient in the consulting room of a surgeon, and refused at the time to be re-vaccinated. His attack affords another illustration of the selective action of the infection of Smallpox, because the others then present in the surgery (save a young boy) had been re-vaccinated last spring, and none have been attacked save himself.

Of the 6 associated cases, 2 were removed from the City Poorhouse, 1 from Bridgeton, 1 from Possilpark, and 2 from the Northern District.

Early in the fortnight one case in Bridgeton was brought to notice, and the circumstances suggest that endeavours had been made to suppress knowledge of its existence. The patient, a child aged ten years, on being seen, had been ill and was confined to bed for over two weeks; she was unvaccinated, as was also her sister, who, along with the father, have since developed the disease, and are now in Hospital.

(Extract from Report for Fortnight ending 8th February, 1902.)

23 cases of Smallpox were registered during the fortnight, compared with a similar number during the previous fortnight, the distribution remaining much as formerly, 13 having occurred in the Northern District, 4 in the Central, and 3 in each of the Eastern and Southern Districts. Inmates of Model Lodging-houses still supply the majority of the cases from the Northern District, 3 having occurred in that which was originally infected and 6 in another Model in the neighbourhood. The other cases here were removed from Church Place, Cowcaddens, Mary Street, and Springburn Road, one only being traceably associated with the Model cases.

In the Model which became secondarily infected there were several inmates who had formerly been seen as visitors in the other.

Of the 3 cases occurring in the Central District, 2 were in Model Lodging-houses, and 1, removed from the Calton District, is associated with a case in the previous fortnight.

Of the cases occurring in the Eastern District, one is father of the child referred to last fortnight as affording illustration of an endeavour to conceal the existence of the disease; a second is an unvaccinated baby who has been taken to visit this household, but information thereof withheld until the sickness occurred; while a third was a worker in the Provanmill Gas-works, and associated with a case in the North Woodside District.

Of the 3 cases occurring in the Southern District, 1 is associated with a case in Struthers Street; 1 was a lodger in the house of the case removed during the previous fortnight, and was, at the time of sickening, under observation in the Reception House; and in 1 the origin of the disease cannot be traced.

(Extract from Report for Fortnight ending 22nd February, 1902.)

The most striking feature in the movement of this disease during the past fortnight has been the sharp increase in the number of cases occurring during the first week. Between November, when the first cases of the present recrudescence of the disease began, and the end of December, only 10 were known to have occurred in the City, 9 of which were in the Northern and 1 in the Southern District.

In the first fortnight of this year a definite association of cases was discovered, as described at the time, in a Model Lodging-house, also in the Northern District, and of 84 cases in all reported prior to the end of the fortnight ending 8th February, 59 were in the Northern and only 8 in the Eastern District of the City. During the fortnight just closed, however, the area of distribution has not only widened, but the incidence has changed, as is shown in the following Table:—

	Central.	Eastern.	Northern.	Southern.	Western.	S.-S.	N.-W.	Total.
16th Nov.,	- ...	...	1	...	...	...	...	1
30th „	- ...	...	5	...	...	...	...	5
14th Dec.,	- ...	...	3	1	...	...	...	4
28th „	- ...	...	...	...	...	...	...	...
11th Jan.,	- 2	1	24	...	...	...	1	28
25th „	- 4	3	13	2	1	...	...	23
8th Feb.,	- 3	4	13	3	..	...	...	23
	—	—	—	—	—	—	—	—
	9	8	59	6	1	...	1	84
Fortnight ending 22nd Feb.,	12	102	14	7	3	2	7	147
	—	—	—	—	—	—	—	—
	21	110	73	13	4	2	8	231
	==	==	==	==	==	==	==	==

The circumstances just related demonstrated the need for reverting to active re-vaccination in the Eastern District, and the Special Committee authorised the employment of twelve additional vaccinators, who, with the Inspectors, form a corps of about thirty-one officers, which is nightly engaged, chiefly in the Eastern Districts in infected tenements, but generally wherever we have reason to believe that vaccination has been imperfectly carried out.

(Extract from Report for Fortnight ending 8th March, 1902.)

During the fortnight 92 cases of Smallpox were registered, as against 146 for the previous fortnight.

Of 39 cases occurring in the Eastern District, 29 occurred in Districts 7 and 8.

Of the cases in the Western District, 12 have been associated with a hotel there, either directly or at the time they contracted the disease. As a result of this, it has been necessary to instruct the proprietor to prohibit new admissions until a fortnight has elapsed without any new case occurring. The staff and a considerable proportion of the visitors accepted re-vaccination.

During the fortnight the first illustration has occurred of Smallpox attacking one of the employees. In this case the patient is a washerwoman, employed at the washing-house, Belvidere, who was permitted to begin work without being re-vaccinated.

Several illustrations have also occurred where the sickness only developed after a period of complete confinement to the house for longer than the period of incubation. This has been especially noticed in connection with several cases in the Southern District of the City, and suggests the diffusion of the disease by vagrants or itinerant vendors of small wares. We are also having repeated illustrations of the selective power of Smallpox infection in the occurrence of the disease in families where the patient alone is the only member unprotected by previous re-vaccination.

The vaccination corps has been further reinforced, so that now about forty operators are engaged nightly in pressing re-vaccination in the infected districts. An almost complete apathy, however, prevails, and little re-vaccination is accomplished save in tenements where cases occur.

Little advantage is being taken of the arrangements formerly made, by which a fee is paid by the Corporation for successful re-vaccination of citizens by medical practitioners.

The details of the district distribution down to May, 1902, is contained in Table III. Up till 5th April the disease in District 7 had reappeared in 36 instances in a tenement from which cases had been removed during 1900-01, but in no case was there a recurrence in the same house, nor were any patients admitted in whom there was evidence of successful re-vaccination having been performed during the earlier period of the outbreak.*

* See Note of 11th January, 1902.

DISTRICT DISTRIBUTION.

The number of cases admitted to Hospital, including 61 from beyond the City boundary, in each of the periods was as follows:—

	Cases.	Deaths.	Case-Mortality.
Pre-epidemic Period—			
April—December, 1900, ...	387	46	11·9
Epidemic Period—			
January—June, 1901, ...	1,423	192	13·5
Recrudescence—			
November, 1901—3rd May, 1902,	469	?	?

PRE-EPIDEMIC AND EPIDEMIC PERIODS.

Till the close of the epidemic period the cases numbered 1,759, only 10 of which were not removed to Hospital, the attacks having ended in death or recovery at home before their nature was recognised. Two hundred and thirty-four deaths occurred. These figures represent an attack-rate for the whole population of 2·3 per 1,000, a death-rate of ·3 per 1,000, and a case-mortality of 13·3 per cent.

In Table IV. (p. 24) the population of each Sanitary District, the number of cases and deaths, and the rate per million of population is stated, the grouping of the districts being arranged from those in which the disease was most prevalent to those in which it was least so. The cases occurring during the recrudescence are not included.

The unequal incidence of the disease here shown will best be appreciated by a comparison of the attack-rate in the several districts.

Greenhead and London Road (District 7) had an attack-rate of 9·9 per 1,000 living, which is fully six times that of the other districts, and fully four times that of the City generally. Next in point of severity of incidence comes Barrowfield (District 8), which lies between the Greenhead and London Road sections of District 7), with an attack-rate of 6·4 per 1,000. District 11, where the outbreak began, stands third, but here the rate is less than half that of District 7, and barely twice the City rate.

Further comparison will be simplified by grouping the districts according to their administrative divisions, as in the following Table:—

POPULATION, CASES, AND DEATHS IN EACH ADMINISTRATIVE DISTRICT.

ADMINISTRATIVE DISTRICT.	Population.	Cases.	Deaths.	RATE PER MILLION.		Case-Mortality per Cent.
				Cases.	Deaths.	
Eastern, ...	173,104	1,063	134	6,141	692	12·6
Central, ...	111,784	216	31	1,932	277	14·4
Southern, ...	132,718	239	30	1,801	226	12·6
Northern, ...	166,825	123	19	737	114	15·4
Western, ...	61,092	52	9	851	147	17·3
South Suburban, ...	64,205	55	10	857	158	18·1
North-Western, ...	51,984	11	1	212	19	9·1
City, ...	761,712	1,759	234	2,309	307	13·25

TABLE IV.—RETURN OF CASES AND DEATHS IN EACH SANITARY DISTRICT.

SANITARY DISTRICTS.	Population.	CASES.		DEATHS.	
		Number.	Rate per Million.	Number.	Rate per Million.
EASTERN.					
7. Greenhead and London Road,	66,197	660	9,970	73	1,103
8. Barrowfield,	27,696	179	6,463	26	939
5. Bellgrove and Dennistoun, ...	79,211	224	2,828	35	442
CENTRAL.					
11. Calton,	22,169	94	4,240	12	541
6. High Street and Closes East,	7,102	21	2,957	2	282
9. Monteith Row,	4,267	11	2,578	1	234
13. Brownfield,	3,924	10	2,548	...	...
12. St. Enoch Square,	3,000	5	1,667	1	333
14. Bridgegate and Wynds, ...	3,880	6	1,546	1	258
1. Exchange,	24,431	34	1,392	8	327
10. St. Andrew Square,	4,794	5	1,043	1	209
3. High Street and Closes West,	9,669	8	827	1	103
Bl. Blythswood,	28,548	22	770	4	140
SOUTH.					
21. Hutcheson Square,	70,229	146	2,079	18	256
22. Gorbals,	13,096	24	1,833	2	153
19. Kingston,	40,407	63	1,559	10	247
20. Laurieston,	8,986	6	668	...	...
NORTH.					
4. St. Rollox,	15,907	31	1,948	6	377
16. Cowcaddens,	18,206	19	1,043	4	220
— Springburn and Rockvill, ...	35,527	26	732	3	84
31. Possilpark and Barnhill, ...	21,694	11	507	1	46
15. Woodside,	70,145	34	485	5	71
2. Port-Dundas,	5,346	2	374	...	...
WEST.					
18. Anderston,	28,858	40	1,386	7	243
17. Kelvinhaugh and Sandyford,	32,234	12	372	2	62
SOUTH-SUBURBAN.					
24. Crosshill,	7,626	11	1,442	2	262
23. Govanhill,	23,191	26	1,121	5	216
27. Pollokshields, West, and Bella- houston,	5,711	5	875	...	...
25. Langside and Mount Florida,	14,847	9	606	1	67
26. Pollokshields and Strathbungo,	12,830	4	312	2	156
NORTH-WEST.					
28. Hillhead,	8,537	4	469	...	...
30. Maryhill,	35,657	6	168	1	28
29. Kelvinside,	7,790	1	128	...	...
	761,712	1,759	2,309	234	307

QUESTION OF HOSPITAL INFLUENCE.

During the progress of the outbreak it became obvious that some circumstance not essential to epidemic movement was determining this undue prevalence in the Eastern District.

We have already seen that early in June, 1900, an indication of this had occurred. As the outbreak developed, although in actual numbers the cases from this district were largely increased, their relative proportion to cases occurring elsewhere was only slightly raised.

During the epidemic prevalence of the disease early in the seventies, a similar aggregation of cases occurred around Parliamentary Road Hospital, and we may, by comparing the district distribution in some of the intervening years, discover whether this concentration of cases in the neighbourhood of the hospital takes place only when smallpox is epidemic, or whether it occurs also at any time when cases have to be dealt with.

In the following Table this is calculated for each of the years in which Smallpox was present in the City since 1892, and, for purposes of comparison, the distribution of the cases in 1900-1901, and the proportion of population residing in each of the districts is included:—

SMALLPOX.—PROPORTION FROM EACH ADMINISTRATIVE DISTRICT OF THE TOTAL CASES OCCURRING IN SEVERAL YEARS.

Year.	Total Cases.	PERCENTAGE OF TOTAL CASES.						
		East.	Central.	South.	North.	West.	S.S.	N.W.
1900-1901 }	1,759	60·4	12·3	13·6	7·0	3·0	3·1	·6
1892	78	28·2	19·2	26·9	3·9	20·5	1·3	—
1893	386	45·9	24·7	9·7	12·8	3·8	·8	2·3
1894	49	32·7	36·7	16·3	8·2	2·0	4·1	—
1895	243	33·4	14·0	9·0	5·8	36·2	·8	·8
1896	5	—	—	—	—	—	—	—
1897	59	57·6	3·4	32·2	5·1	—	1·7	—
Percentage Population, 1901, }		23	15	17	22	8	8	7

In each year, therefore, in which smallpox has been present the proportion of cases contributed by the Eastern District has been uniformly in excess of the proportion of the population residing there.

The Central, Southern, and Western Divisions in occasional years present a similar excess, but this is due in most cases to the circumstances under which the several outbreaks were introduced. The excess in the Eastern District is constant, and in none of the other districts is this feature present.

When the Eastern prevalence began in June, 1900, the number of cases in Hospital was comparatively limited, and it is reasonable to assume that, if simple aggregation of smallpox creates an element of risk to surrounding populations, this risk should increase with the density of the aggregation, and result in an exaggerated prevalence in those districts which are exposed to it when compared with those which are beyond its influence.

Could a gradation of risk be thus established, the question of site for such hospitals would be simplified, because it might be assumed that some standard of cubic space per patient could be found at which risk would be reduced to a minimum, if not entirely abolished.

In the preceding Table there is a rough indication of this in the years 1895, 1893, and 1900-1, when the numbers dealt with were 243, 386, and 1,759 respectively, and the proportion of Eastern cases 33, 46, and 60 per cent.

The occurrence during the present outbreak of a period when the disease might be described as prevalent, as distinguished from a subsequent period of epidemic intensity, afforded a further opportunity of comparing the effect which might be attributed to simple aggregation in Hospital with that occurring during a time when the demand for accommodation introduced an element of density in the aggregation, and necessitated a reduction of cubic space per bed.

The proportion of the total cases occurring in the several districts during each of these periods is as follows:—

ADMINISTRATIVE DISTRICT.	Percentage Population (Census 1901).	PROPORTION PER CENT. OF ATTACKS TO TOTAL ATTACKS IN EACH PERIOD.		
		Pre-epidemic.	Epidemic.	Recrudescence till 5th April.
Eastern, - - - -	23	54·8	61·8	44·1
Northern, - - - -	22	5·4	7·3	22·8
Southern, - - - -	17	10·1	14·8	13·5
Central, - - - -	15	22·2	9·6	10·1
Western, - - - -	8	5·7	2·2	4·5
South-Suburban, - -	8	1·5	3·6	1·6
North-Western, - -	7	0·3	0·7	3·4

Again it will be observed that the Eastern District alone presents in each of these periods a proportion of the total attacks much in excess of its proportion of the total population, while the Central District, into which the disease was introduced, has likewise a larger proportion of cases than of population in the first period, which, however, is not maintained in the second.

We are, for the moment, endeavouring to obtain some indication of a relationship existing between the volume of infection contained within the Hospital as distinct from that which may be assumed at least to follow in the wake of a converging stream, both of patients and infected clothing, *plus* the opportunities for acquiring infection through contact, which the occurrence of a large number of cases created before their nature was recognised.

If a numerical relationship be established between the cases occurring before and after the beginning of the year 1901, this, for the City generally, would be expressed by the proportion of 1 to 3·5.

In the Eastern District it was 1 to 3·9, but these formed so large a proportion of the total that the difference is without importance. In the Northern District, however, the relationship is as 1 to 3·6, while in the South it is 1 to 4·9; in other words, there was almost a fivefold increase here during the epidemic period, as compared with a fourfold in the Eastern District; and the cases in the Southern District occurred at a part which is further removed from Belvidere than any portion of Bridgeton.

It is impossible to exclude from this the operation of widely distributed opportunities of infection which we know existed, but a comparison of the proportion of Eastern cases in the several stages of invasion, early activity, decrease, and subsequent epidemic prevalence of the disease, shows that a general correspondence existed, not so much with the accumulated numbers under treatment, as with the fluctuations in the number of admissions, although even here the parallel breaks down when applied to the early period of the epidemic increase.

PROPORTION OF CASES OCCURRING IN EACH DISTRICT TO TOTAL CASES IN SEVERAL PERIODS.

PERIOD ENDING	Total cases in each period.	PERCENTAGE OF TOTAL CASES.						
		East.	Central.	North.	South.	West.	S.S.	N.W.
2nd June, - - -	72	25·0	45·8	19·4	4·2	2·8	2·8	...
11th August, - - -	159	66·7	14·5	6·9	10·1	1·2	0·6	...
17th November, - - -	73	53·4	13·7	1·4	23·3	4·1	4·1	...
29th December, - - -	93	56·9	18·3	...	5·4	17·2	1·1	1·1
9th February, - - -	550	65·5	6·2	5·1	16·3	1·1	5·6	0·2
23rd February, - - -	127	52·7	15·7	8·7	13·4	1·6	5·5	2·4
23rd March, - - -	460	71·2	10·0	6·5	9·2	1·3	1·3	·5

In the period of activity between 2nd June and 11th August, 1900, 67 per cent. of the cases were Eastern, the average weekly admissions to Hospital at the earlier date being 12·5; during the period of autumnal decrease—between 11th August and 17th November—the proportion of admissions from the Eastern Division was 53 per cent., while the weekly admissions averaged 5·2; 57 per cent. of the admissions from the middle of November till the close of the year were Eastern, during which period the average weekly number of admissions was 15·5; that it rose to 65 per cent. in the four weeks ending 9th February, when the weekly admissions averaged 138, and to 71 per cent. in the four weeks ending 23rd March, when the weekly admissions averaged 115.

The proportion of Eastern cases during the epidemic period, but especially in the four weeks ending 23rd March, seems to suggest a definite time relationship with the numbers under treatment, which reached their maximum on 8th March, when there were 522 patients in Hospital, but a comparison of the fortnightly admissions for the several fortnights of this period does not confirm the impression.

PROPORTION OF CASES OCCURRING IN EASTERN DISTRICT TO TOTAL CASES REGISTERED IN SEVERAL FORTNIGHTS, WITH MAXIMUM AND MINIMUM NUMBER IN HOSPITAL DURING THE FOURTEEN DAYS PRECEDING EACH PERIOD.

		Fortnight ending				
		Jan. 26.	Feb. 9.	Feb. 23.	Mar. 9.	Mar. 23.
Proportion of Cases admitted from Eastern District to total for Fortnight, - - - -	}	73.1	51.4	52.7	73.2	67.7
Maximum under treatment during previous 14 days, - - - -	}	106	409	500	485	522
Minimum do. do., - - - -		98	96	409	387	394

Here an equal proportion of new cases was occurring in the fortnights ending 26th January and 9th March, although the numbers admitted in the fortnight preceding each (*i.e.*, 12th January and 23rd February) were respectively 23 and 127, while the greatest number in Hospital in each of these last fortnights was 103 and 485, and, in contrast to both, 67.5 of the cases occurring in the fortnight ending 16th June, 1900, occurred at a time when the number in the wards was 67.

Again, in the following comparison, we find that in Districts 7 and 8 about one-third of the total cases occurring sickened in the four weeks ending 2nd February, while the proportion occurring in the four weeks ending 2nd March was little over a-fourth, although during the weeks of both periods the numbers under treatment in Hospital were rapidly increasing. In March again only 16 per cent. occurred.

PERCENTAGE OF CASES OCCURRING DURING SEVERAL PERIODS OF FOUR WEEKS EACH TO TOTAL CASES SICKENING IN DISTRICTS 5, 7, AND 8 DURING EPIDEMIC PERIOD.

Four Weeks ending				Districts		
				V.	VII.	VIII.
2nd February,	...	...	...	28	34	32
2nd March, ...	...	...	...	24	26	26
30th ,, ...	...	...	...	14	16	15

These comparisons have been undertaken with the double object of ascertaining whether Smallpox Hospitals radiate infection in a degree proportioned to the mass of infection within them, and whether any principles might be deduced which could guide further policy with regard to Hospital provision.

In the 1870-74 epidemic the disease was propagated in the neighbourhood of Parliamentary Road Hospital, where Smallpox was then treated.

During the limited outbreaks which occurred from 1892 onwards, we have found a preponderating proportion of cases invariably contributed by the Eastern

Districts. In the maps which are appended illustrating the present outbreak, there is no aggregation of cases beyond the mile and a-quarter radius from the Hospital which at all corresponds with the evidence of persistent recurrence of the disease within it.

We have seen that towards the end of May, 1900, cases began to occur in the immediate neighbourhood of Belvidere, which indicated exposure to infection at a date when the cases under treatment barely exceeded 30 daily.

At a later period, increasing numbers in Hospital were associated with increasing prevalence in its neighbourhood, yet their proportion to the total volume on each occasion varied only by a few per cent., while the numbers in Hospital were multiplied from six to sixteen times.

There is, however, a general correspondence between the proportion of cases occurring in the neighbourhood of the hospital and the numbers dealt with, but this is lost during the epidemic period, and the first wave of epidemic prevalence, early in January, 1901, cannot be brought into any definite relationship with the numbers in Hospital when it began. It is to be explained rather by widespread distribution of infection occurring earlier, while with regard to the subsequent and more restricted increases towards the end of February the conditions had altered, because in the Eastern District re-vaccination was being largely resorted to with every recurring wave of prevalence, and the March increase had, in consequence, a more restricted field for activity. It was, moreover, felt elsewhere, as we may see by a comparison of the cases in the Southern District, during this phase.

It would appear, therefore, to be a not unwarrantable deduction that the risk of aggregation begins at a very early period, and tends to foster a prevalence of the disease in the neighbourhood of Smallpox Hospitals; but that when epidemic virulence is established, the precise influence exerted by the Hospital cannot be dissociated from that caused by the independent centres, which it has in part established.

The investigation throws no light on the channels through which influence is exercised, except what is of a negative character. The Eastern cases began when there was no pressure on ward space; they reappeared at a period of the recrudescence when this was being specially guarded against; and but few of the cases in this period recurred in formerly infected tenements. The topographical relationship of the Hospital to the surrounding population outside the quarter of a mile radius does not admit of any discrimination between the effect of aggregation and the precedent volume of traffic, both in patients and infected clothing, through the main thoroughfares of the infected district. But a survey of the whole circumstances leads inevitably to the conclusion that the excessive prevalence in the Eastern District has established the unsuitability of Belvidere for the continued treatment of Smallpox.

In respect to this element of risk to the neighbourhood, Smallpox Hospitals differ from those for the other infectious diseases. They also differ in another important particular. Since the last epidemic prevalence, in 1870-74, the provision of smallpox accommodation has not been completely taxed until the present outbreak.

In the present outbreak an interesting feature bearing on this was disclosed. The incidence of the disease at ages 25-35 was much in excess of that at any other age period, and indicates that in communities relying solely on infantile vaccination

the conditions on which epidemic prevalence depends are re-established by this period.

In these circumstances, how to meet both contingencies—a recurring epidemic prevalence at long intervals, and the added risk of concentration present at all times, but felt most when the pressure is greatest—is the problem which attends all effort to map out a policy of Smallpox Hospital provision. To maintain several Hospitals constantly equipped for a remote contingency, however certain may be its recurrence, would mean waste. A certain minimum accommodation must always be provided to meet the minor fluctuations of prevalence which occur between epidemic periods, but to establish this as the sole centre of aggregation in epidemic periods results in producing a surrounding mass of infection, which may be dealt with, but cannot be controlled. To escape the greater risk we should avoid the concentration, and though, as our experience indicates, a certain degree attends all aggregations, we might still be able to accomplish in detail what the combined volume renders impossible.

RELATION OF SMALLPOX INCIDENCE TO DISTRICTS GENERALLY PRESENTING A HIGH DEATH-RATE.

Insanitary conditions are so frequently cited as explaining the excessive increase of Smallpox in any particular locality that we may enquire whether the recorded death-rates for the districts chiefly affected afford any support to this.

In the following Table the average general death-rates for six districts presenting the highest rates during 1898-1900 are stated, together with corresponding rates for Districts 5, 7, and 8, which form the Eastern Division, and the smallpox attack-rate for each :—

SMALLPOX ATTACK-RATE AND GENERAL DEATH-RATE, 1898-1900, COMPARED.

DISTRICT.	Deaths per 1,000 from all causes.	Smallpox Attack- rate per 1,000.
13. Brownfield, - - - -	33·06	2·5
16. Cowcaddens, - - - -	32·79	1·0
6. High Street and Cloves East, -	30·43	2·9
2. Port-Dundas, - - - -	29·55	·3
22. Gorbals, - - - -	28·89	1·8
3. High Street and Cloves West, -	28·62	·3
Glasgow, - - - -	20·6	2·3
EASTERN DIVISION.		
7. Greenhead and London Road, -	22·0	9·9
8. Barrowfield, - - - -	25·7	6·4
5. Bellgrove and Dennistoun, -	19·0	2·8

There is no suggestion here that the prevalence of insanitary conditions, as indicated by a continuously high general death-rate, explains the excessive incidence of Smallpox in Districts 5, 7, and 8.

Again, if we select for further comparison the infantile death-rate, the Zymotics (excluding Smallpox) and that from Pulmonary Diseases (excluding Phthisis), in no case is there a parallel to the contrast presented by the death-rate from Smallpox in these districts.

DISTRICT.	Death-rate under 1 year per 1,000 born.	DEATH-RATE PER MILLION.		
		Zymotic Diseases.	Respiratory Diseases (not Phthisis).	Smallpox.
13. Brownfield, - - - -	207	5,303	8,934	...
16. Cowcaddens, - - - -	218	5,033	9,379	220
6. High Street and Closes East,	198	3,839	5,394	282
2. Port-Dundas, - - - -	224	4,288	8,150	...
22. Gorbals, - - - -	209	4,768	7,487	153
3. High Street and Closes West,	177	3,262	6,597	103
City, - - - -	153	3,153	4,617	307
7. Greenhead and London Road,	152	4,319	4,826	1,103
8. Barrowfield, - - - -	180	4,813	6,510	939
5. Bellgrove and Dennistoun, -	142	3,185	4,104	442



AGE INCIDENCE OF ATTACKS.

In the following Table the proportion of the population living at several age periods, together with the proportion of cases and the attack-rate per million living at each, is stated. No discrimination is here made between vaccinated and unvaccinated, but the Table shows that at each age period under 20 the proportion of attacks is smaller than the proportion of population—that 22 per cent. of the population living under 10 years of age contribute only 5·8 per cent. of the total cases, while 21 per cent. of the population living between the ages of 15-25 contribute 22·5 per cent., and that 18 per cent. of the population living at ages 25-35 contribute twice that proportion of the cases. There were almost 5 attacks per 1,000 living between 25-35, so that the susceptibility to Smallpox at this period of life is considerable.

TABLE V.—GLASGOW.—PROPORTION OF POPULATION AND CASES AT CERTAIN AGE PERIODS, SHOWING THE NUMBER OF CASES AND THE ATTACK-RATE PER MILLION AT EACH.

Ages.	Proportion of Population.	Proportion of Cases.	Number of Cases.	Attack-rate per Million.
0—5	11·9	3·47	61	672
5—10	10·5	2·39	42	526
10—15	9·8	5·91	104	1,393
15—20	10·1	7·62	134	1,745
20—25	10·9	14·89	262	3,143
25—35	17·5	35·82	630	4,734
35—45	12·4	20·01	352	3,731
45—55	8·6	7·22	127	1,942
55—65	5·2	1·76	31	775
65 and up.	3·1	0·91	16	684
...	...	100·00	1,759	...

INFANTILE VACCINATION.

This contrast in the age incidence may be viewed together with what is known of the extent to which the requirements of the law in respect to infantile vaccination are complied with in Glasgow.

In several periods the proportion of children “not accounted for” in the vaccination returns is as follows:—

RETURN OF CHILDREN “NOT ACCOUNTED FOR” IN THE VACCINATION RETURNS OF
GLASGOW REGISTRATION DISTRICTS IN CERTAIN PERIODS.

	Births.	Removed from Districts before Vaccination, or otherwise not accounted for.	
		No.	Percentage.
Three years, 1879-81,	63,661	1,822	2·9
„ 1886-88,	64,189	1,359	2·1

GLASGOW.—RETURN AS TO VACCINATION OF CHILDREN, COMPILED FROM SUPPLEMENT TO THE
MONTHLY AND QUARTERLY RETURNS OF THE REGISTRAR-GENERAL FOR SCOTLAND.

	1896.		1897.		1898.		1899.		1900.	
	No.	Per-centage.	No.	Per-centage.	No.	Per-centage.	No.	Per-centage.	No.	Per-centage.
Successfully vac- cinated, - -	20,348	84·7	19,932	83·5	20,080	82·8	20,191	83·3	20,512	84·2
Vaccination post- poned, - -	274	1·1	259	1·1	256	1·0	215	0·9	162	0·7
Insusceptible of Vaccination,	214	0·9	212	0·9	184	0·8	201	0·8	196	·8
Died before vac- cination, -	2,546	10·6	2,808	11·7	2,918	12·0	2,865	11·8	2,785	11·4
Removed from the district, or otherwise not accounted for,	650	2·7	668	2·8	825	3·4	775	3·2	703	2·9
Total Births dur- ing year, -	24,032	100·0	23,879	100·0	24,263	100·0	24,247	100·0	24,358	100·0

The reduction in the second period (1886-8) here shown expresses the result of a systematic effort on the part of the Sanitary Department to reduce the portion “not accounted for” in those years. In the individual years 1896-1900 the tendency towards an increasing proportion again becomes manifest, which reached a maximum of 3·4 per cent. not accounted for in 1898. The reduction in the proportion occurring in 1900 is probably the result of the stimulus afforded by the presence of Smallpox.

We are unable to ascertain the proportion unaccounted for in the several Sanitary Districts, because no combination of these will quite represent the Registration Districts, but, in a general way, Bridgeton, Camlachie, and Dennistoun enter largely into the Eastern Sanitary Division, and Blythswood and Milton Registration Districts are respectively Central and Northern. These are selected because they represent in one case the area where Smallpox was most prevalent, and in the other where vaccination was most neglected—Blackfriars being unavailable for comparative purposes owing to the presence of the Maternity Hospital.

In the following Table details corresponding to these already given for the whole City are given for the Registration Districts for the years 1896-8:—

GLASGOW.—BIRTHS, WITH NUMBER AND PROPORTION “NOT ACCOUNTED FOR” IN
VACCINATION RETURNS.

				BIRTHS, 1896-8.	NOT ACCOUNTED FOR.	
					Number.	Percentage.
Bridgeton,	...	...	...	5,497	122	2·2
Camlachie,	...	...	...	5,648	110	1·9
Dennistoun,	...	...	...	7,553	161	2·1
Calton, ...	...	...	...	3,495	98	2·8
Blackfriars,	...	...	...	4,179	262	6·3
St. Rollox,	...	...	...	5,386	89	1·7
Blythswood,	...	...	...	2,152	83	3·9
Milton, ...	...	...	...	4,735	166	3·5
Kelvin, ...	...	...	...	5,453	81	1·5
Anderston,	...	...	...	4,555	95	2·1
Hutchesontown,	...	...	...	8,030	270	3·4
Gorbals,	...	...	...	4,418	116	2·6
Tradeston,	...	...	...	2,398	73	3·0
Kinning Park, ...	...	...	...	1,465	39	2·7
Total,	...	...	...	64,964	1,765	2·7

AGE DISTRIBUTION IN RELATION TO VACCINATION AND FATALITY.

In the subjoined Table all admissions to Hospital from Smallpox are dealt with; the numbers include 61 from neighbouring Local Authorities. The vaccinated and unvaccinated are distinguished from those in whom vaccination was said to have been performed, but who presented no discoverable trace of the operation. One-half of these latter were confluent in type, 11 per cent, were hæmorrhagic. It is very doubtful whether they are entitled to separate classification. A primary vaccination scar is practically indelible, and any local reaction following the performance of the operation of vaccination which does not result in a cicatrix presenting the well-known characters is scarcely to be regarded as successful. At every age save those under 10, the fatal attacks of this class equal or exceed those recovering, but the numbers here dealt with are small, and the percentage fatality consequently liable to fluctuation. It is probable that the majority are illustrations of persons in whom the operation was unsuccessful, and that they should be included in the unvaccinated class:—

All these were unvaccinated prior to contracting the disease, and we shall clearly appreciate the significance of this by considering the age incidence more in detail. For this purpose I have selected two periods with which to compare the present age incidence of smallpox deaths, viz., 1855-57, being the early years of death registration (and during two of which Smallpox was prevalent), and 1870-72, when it was also present in epidemic form.

TABLE VII.—GLASGOW.—SMALLPOX.—DEATHS AT CERTAIN AGE PERIODS IN 1855-57, 1870-72, AND 1900-01, SHOWING THE PROPORTION OF TOTAL DEATHS AT EACH AGE.

AGES.	DEATHS.			PERCENTAGE OF TOTAL DEATHS.		
	1855-7.	1870-2.	1900-01.	1855-57.	1870-72.	1900-01.
Under 3 months, ...	47	24	10	6.4	6.7	4.2
„ 6 „ ...	40	32	6	5.5	8.9	2.5
„ 1 year, ...	161	16	7	22.1	4.5	3.0
„ 2 years, ...	172	5	14	23.6	1.4	5.9
„ 3 „ ...	104	5		14.3	1.4	
„ 4 „ ...	53	4		7.3	1.1	
„ 5 „ ...	39	9		5.3	2.5	
„ 10 „ ...	31	43	2	4.3	12.0	0.8
„ 15 „ ...	10	31	6	1.4	8.7	2.5
„ 20 „ ...	15	27	3	2.0	7.6	1.3
„ 25 „ ...	31	59	18	4.3	16.5	7.6
„ 35 „ ...	17	66	56	2.3	18.4	23.5
„ 45 „ ...	6	23	61	0.8	6.4	25.6
„ 55 „ ...	3	8	36	0.4	2.2	15.1
„ 65 „ ...	—	5	14	0.0	1.4	5.9
65 years and over, ...	—	1	5	0.0	0.3	2.1
All Ages, ...	729	358	238*	100.0	100.0	100.0

* Includes Deaths in Hospital of Patients from beyond City Boundaries.

The broad distinction presented in these Tables has often been pointed out, and may thus be summarised for the three periods:—

Proportion of Deaths.	1855-57.	1870-72.	1900-1.
Under 10,	88.8	38.5	16.4
Over 10,	11.2	61.5	83.4

In the two periods of life here contrasted the proportion of deaths under and over 10 years of age becomes almost exactly reversed. But the Tables are

interesting from another aspect. In the first two periods compared, a notable reduction occurs in the proportion of deaths occurring under 5 years of age, but between 5 and 10 the proportion in the 1870-72 outbreak increases just as do those at later ages. Indeed the contrast presented is rather as between ages under and over 5 years, and no less than 12 per cent. of the deaths in 1870-72 were at ages 5-10. At this period of life during the present outbreak less than 1 per cent. of the deaths occurred, and the increase which is so marked in 1870-72 is obviously the result of a large number of susceptible children existing in the population from among those born in the years preceding the commencement of the Vaccination Act in Scotland in 1864. Along with this, it will be noted that the six months which elapse between the birth and vaccination of a child in Scotland is reflected in the still large proportion of deaths occurring in the early months of infancy.

RE-VACCINATION.

The Health Committee early recognised the necessity for special effort being made to accomplish re-vaccination of the population, and on 11th June, 1900, the following circular was issued, with their approval, to medical practitioners:—

11th June, 1900.

DEAR SIR,

SMALLPOX—RE-VACCINATION.

PUBLIC HEALTH (SCOTLAND) ACT, 1897, SEC. 77.

In view of the present distribution of Smallpox in Glasgow, the Corporation (Police Department), as Local Authority, desire to impress on the community the extreme desirability of each of its members acquiring the complete protection from the disease which recent successful re-vaccination affords. They are also desirous of affording to every inhabitant who may wish to be re-vaccinated, but who cannot afford to pay for the operation, facilities for having it done. They have resolved to exercise the power conferred upon them by the 77th Section of the Public Health (Scotland) Act, and are prepared to pay to practitioners who re-vaccinate such persons a fee of 1s. 6d. for each successful vaccination. The Corporation believe that if by any means they could obtain the re-vaccination of every individual in Glasgow above ten years of age, and the primary vaccination of all who had never been vaccinated, an epidemic prevalence of Smallpox would be impossible within their jurisdiction.

The conditions of payment of this fee are these—

1. It is not in addition to, but in place of, any private fee.
2. The name, age, address in full, and result in each case must be returned to me every Saturday, on forms to be supplied, the postage of which will be repaid.
3. The sums due will be made up from these lists, and paid at the same time and in the same way as fees under the Infectious Diseases (Notification) Act, viz., in June and December.

The Corporation rely upon your active co-operation in urging all persons within the scope of these conditions over whom you have influence to take advantage of this opportunity of putting themselves beyond the reach of Smallpox.

I am,

Yours truly,

A. K. CHALMERS,
Medical Officer of Health.

Special representation was also made to every employer of labour among whose workers any case of the disease was recognised, and the Tramways Committee, through their General Manager, set an excellent example during this month in procuring the re-vaccination of all their employees. But with the diminishing number of fresh cases as the summer advanced, interest in the question was practically confined to the immediate neighbourhood of the cases, and to the factories where they were employed. This is best illustrated by contrasting the number of persons re-vaccinated at their own residences—in and around infected tenements—with the number of those availing themselves of the offer through medical practitioners, as given in the following Table:—

SUMMARY OF THE VACCINATIONS AND RE-VACCINATIONS DONE BY THE OFFICERS OF THE SANITARY DEPARTMENT AND BY PRACTITIONERS DURING 1900.

	Primary.	Secondary.
At Office,	550	264
At Hospitals,	7	205
At Residence, by Staff of Department,	5	6,372
By Practitioners, in terms of circular of 11th June,	8	964
In Prisons,	—	196
Total,	570	8,001

When the rapid increase in the number of admissions to Hospital during January, 1902, gave ample evidence that the outbreak was assuming proportions quite unknown locally in recent years, a second circular to practitioners was issued, which differed in two important particulars from the earlier one. It reduced the age limit for re-vaccinations to five years because of the number of children admitted with trifling vaccination cicatrices, and withdrew the stipulation regarding the inability of the person desiring re-vaccination to pay a fee for the operation. This circular was in the following terms:—

Sanitary Department, 23 Montrose Street,
Glasgow, 24th January, 1901.

CIRCULAR LETTER TO PRACTITIONERS.

SMALLPOX—RE-VACCINATION.

DEAR SIR,

In June last the Health Committee issued a circular to practitioners inviting them to urge the desirability of re-vaccination on all with whom they had influence. The response to this was extremely disappointing, largely because of indifference to re-vaccination, resulting probably from the limited number of the cases of Smallpox occurring at that time. The circumstances are now much altered.

Smallpox has assumed alarming proportions. Already the number of cases occurring daily exceeds anything which the City has experienced since 1873, and although at the present moment the greatest prevalence is in Parkhead, Bridgeton, Dalmarnock, and the Eastern Districts of the City generally, there are indications that other districts, notably Gorbals, Govanhill, and Anderston, are on the eve of a similar expansion of the disease. *Nothing, save a general recourse to re-vaccination, will prevent its spread throughout the City generally.*

In the circumstances the Health Committee would again invite your active co-operation in urging re-vaccination. They are thoroughly convinced that *if every consulting room became an active re-vaccinating centre* many lives would be saved, the virulence of the present outbreak would rapidly become moderated, and an invaluable service be rendered alike to the Corporation and the community.

The Committee are therefore prepared to pay for the successful re-vaccination of any person over five years of age a sum of 1s. 6d., under the following conditions:—

1. The name, age, address in full, and result in each case must be returned to me every Saturday, on forms to be supplied, the postage of which will be repaid.
2. The sums due will be made up from these lists, and paid at the same time and in the same way as fees under the Infectious Diseases (Notification) Act, viz., in June and December.
3. Lymph will be supplied on application (personally or by messenger) at the Sanitary Office.

As many of the cases occurring among imperfectly vaccinated persons are of a mild and modified type, the recognition of Smallpox is apt to be extremely difficult, and this is enhanced by the fact that it is in these cases that the various prodromal eruptions are apt to appear. These eruptions bear no resemblance to the true variolar eruption, but, on the contrary, may closely simulate typhus fever, scarlet fever, or measles.

With the object of facilitating the recognition of such cases, I append the following note.

I am, DEAR SIR,

Yours truly,

A. K. CHALMERS.

N.B.—Efficient vaccination is only to be obtained when the total area of vesiculation produced is not less than half a square inch in size on the eighth day, and a similar result should be aimed at in re-vaccination.

A. K. C.

APPENDIX.

Prodromal eruptions, which are apt to be very puzzling, may assume the following forms:—

1. The most common is general erythema, closely resembling the rash of scarlet fever, affecting chiefly the trunk, but passing later to the extremities. This eruption may persist after the true papular eruption has been out for a day or two.
2. A coarsely punctate erythema, sometimes becoming petechial, appears on the groin and sides of the abdomen. It is generally confined to a triangular area, bounded above by an imaginary line crossing the abdomen transversely a little below the umbilicus, and bounded laterally by lines passing from the iliac crests to an imaginary point about four inches below the pubes.
3. A dusky brown tint, not very obvious, and fading on pressure, generally over lower part of trunk, especially in lumbar and sacral regions.
4. A morbilliform eruption, closely resembling a measles or typhus rash, appears in ill-defined patches on the trunk.

HÆMORRHAGIC SMALLPOX.

In this form the symptoms of invasion are very severe. The face and limbs may remain perfectly normal in appearance. There is, in the complete form, no papular eruption at all; in less marked forms, the papular eruption is very scanty and irregularly developed. It begins with a well-marked erythema on the trunk, especially over the lower part of abdomen. This rapidly extends and becomes livid in tint, and may finally involve the whole trunk. Petechiæ, of variable size, soon make their appearance, in addition to the general staining.

Blood may be voided by all the mucous surfaces, and the ocular conjunctiva may become black owing to hæmorrhage.

Early in the disease the eruption may be mistaken for that of typhus.

N.B.—It is of the greatest importance that every anomalous rash or suspicious cases of illness should be at once intimated to the Medical Officer of Health.

The immediate result of these was to convert the consulting rooms of practitioners in infected districts into vaccination stations, where the work of re-vaccination went on frequently for hours daily. This activity continued until the second wave of prevalence in the beginning of February had subsided; but in the report for the fortnight ending 23rd February I had occasion to observe "that, while the re-vaccinations reported during the fortnight numbered 77,652, as against 36,812 in the previous one, the quantity of lymph issued during the past week by the Department to practitioners has shrunk to such an extent that the amount of active re-vaccination now going on in the community must be very far short of that done during previous weeks. This is much to be regretted, because the seasonal conditions which favour the spread of Smallpox reach their acme in the spring months, and the approach of this period must be regarded with some apprehension if the apathy regarding vaccination, which is again becoming manifest, continues." It is possible that the resolution of the Special Committee appointed to deal with the epidemic, to cease publishing the number of fresh cases occurring daily at this time, helped, in part, to confirm the impression created by the diminishing numbers; but it has been a frequently repeated experience of the Department that the number of re-vaccinations which it is possible to obtain rise and fall with the number of cases of Smallpox occurring, and that prudential motives are apt to remain in abeyance unless stimulated by present risk.

The recurring increase in the number of admissions to Hospital early in March led to the adoption of a system of house-to-house visitation in certain districts, on the lines indicated in the annexed circular:—

Sanitary Chambers, 23 Montrose Street,
Glasgow, 7th March, 1901.

CIRCULAR LETTER TO MEDICAL PRACTITIONERS.

DEAR SIR,

SMALLPOX—RE-VACCINATION.

The Executive Committee gratefully recognise the response recently made by practitioners to my circular of 28th January last inviting them to perform re-vaccination on any who chose to avail themselves of the offer then made. They feel, however, that further effort is required *to reach those who are indifferent to the present risk*, and that this can best be secured by a systematic visitation from house to house in certain districts of the City, and they desire me to invite your co-operation in this work.

Such a scheme would be based on the Census Enumeration Districts. These districts vary in size, but on an average each contains about 150 houses, distributed over from 12 to 15 tenements. This number might readily be covered within a week by taking two tenements each evening, which is the only time when the majority of the inmates are likely to be found at home.

The Committee feel assured that they can with confidence rely on the co-operation of the medical profession in this further effort to secure the re-vaccination of the remaining portion of the population, and a post-card is enclosed, which I have to ask you to be good enough to forward me by return post, stating whether you can find time to devote to the work. For each vaccination so obtained a fee of 2s. 6d. will be allowed.

Yours truly,

A. K. CHALMERS.

While the medical practitioners were thus invited to take up district visitation on these lines, the officers of the Department were aided in the work of vaccination by a special corps, ultimately numbering 484, and composed of 254 students of medicine, and 230 others, chiefly drawn from other departments of the Corporation service, and working under the direction of Dr. Carmichael, Vaccinator to the Department. The energies of this corps were directed, in the first place, to the neighbourhood of those streets where Smallpox was occurring, but as soon as possible they were distributed over the Census enumeration areas. It also became possible to take a census of the condition of these districts in respect to vaccination, the returns, however, being based wholly on the verbal statement of the person in charge of the household at the time of the visit.

It is, unfortunately, impossible to state with any degree of accuracy the extent to which re-vaccination had been carried at this period in the community generally, because information on this point would supply the answer to the question whether any considerable section of a community exposed to a known risk, and with every facility offered of protection against it, are so completely indifferent to both that the means of protection must be brought to them before they will avail themselves of it. When the house-to-house visitation began in March, the census appeared to indicate that 53 per cent. of the population over five years had been recently re-vaccinated. This would represent 355,570 persons on whom the operation had already been performed, which, however, is in excess of the total for which payment was made by the Corporation during the whole outbreak, and is only 49,695 less than is shown by the completed returns of the year. Together with those obtained in 1900, this gives a total of 405,265, and would appear to indicate that house-to-house visitation, directly and indirectly, resulted in procuring an addition of over 49,000 from those who had previously proved indifferent.

Till the close of the fortnight ending March 9th, over 157,000 re-vaccinations had been recorded, as shown in the following Table, but this represents only 23 per cent. of the population over five years of age. Of these, 146,000 had been done by practitioners, but the dates on which the returns were received were not closely related to the fortnights in which the vaccinations had been performed, and, even when all had been returned, the information afforded did not readily lend itself to a detailed tabulation of the numbers performed in successive weeks.

It is probable, therefore, that the estimate of 53 per cent. is in excess of the proportion already re-vaccinated by the beginning of March, and the annexed Table, showing the number of tubes of calf lymph issued by the Department to medical practitioners fairly reflects the ebb and flow of the demand for re-vaccination in the various districts :—

TABLE OF TUBES OF GLYCERINATED CALF LYMPH ISSUED TO PRACTITIONERS.

Date.	January.	February.	March.	April.
1	...	4,557	440	232
2	...	670	755	120
3	...	170	...	130
4	...	3,104	1,664	140
5	...	3,849	2,295	145
6	...	3,006	2,319	120
7	...	3,009	3,359	...
8	...	3,799	4,047	80
9	...	2,789	1,925	130
10	100	70
11	...	2,007	2,499	105
12	...	2,204	3,066	155
13	...	1,292	1,860	40
14	...	895	2,489	5
15	...	998	2,600	35
16	...	594	2,255	10
17	30
18	...	436	1,516	10
19	...	609	1,962	...
20	...	439	1,064	30
21	...	383	880	...
22	...	164	...	45
23	...	280	847	11
24	80	...
25	...	400	550	...
26	...	355	330	...
27	2,776	599	220	...
28	2,240	535	275	20
29	4,055	...	140	15
30	4,707	...	200	28
31	4,363	...	...	...
	18,141	37,143	39,737	1,706

Average Daily Issue—February, 1,326 ; March, 1,281.

SUMMARY OF THE VACCINATIONS AND RE-VACCINATIONS DONE BY THE OFFICERS OF THE
SANITARY DEPARTMENT AND BY PRACTITIONERS DURING 1901.

	Primary.	Secondary.
At Office,	433	486
In Hospitals,	11	556
At Residence, by Staff of Department,	—	14,763
In Prisons and Poorhouses,	24	11,293
By Practitioners, in terms of circular letter of 24th January, 1901,	—	283,423
By Special Vaccinators working in Enumeration Districts,	—	29,081
By Practitioners in Enumeration Districts, in terms of circular letter of 7th March, 1901,	—	12,424
	<hr/>	<hr/>
	468	352,026
In reply to a circular letter, 447 Practitioners intimated that, in addition to those done for the Corporation, they had done private re-vaccina- tions numbering		45,238
		<hr/>
Total re-vaccinations,		397,264
Add for 1900,		8,001
Add for 1902 to 3rd May,		7,972
		<hr/>
		413,237
		<hr/>

RE-VACCINATION IN RELATION TO ATTACK.

In 126 cases admitted it was found that re-vaccination had recently been performed, and the following figures, taken from a Table compiled by Professor R. S. Thomson, Visiting Physician to the Smallpox Hospital, and Dr. Fullarton, Resident Physician, show the number of days intervening between the successful performance of the operation and the development of symptoms of Smallpox :—

Number of Days before Sickening—

0 1 2 3 4 5 6 7 8 9 10 11 12 13

Number of Cases—

6 11 3 7 20 17 6 11 13 4 1 — 1 1

If we assume that twelve days represents the average period of incubation, then the chances of escape are still very considerable, although the re-vaccination may be postponed until the third day after exposure. In a small number of cases re-vaccination had been performed successfully before the attack occurred, but these are at intervals of years, and the following Table, also prepared by Drs. Thomson and Fullarton, shows the interval between re-vaccination and attack, and the character of the latter :—

TABLE SHOWING, IN CASES SUCCESSFULLY RE-VACCINATED BEFORE INFECTION, THE PERIOD BETWEEN RE-VACCINATION AND ATTACK AND THE INFLUENCE OF RE-VACCINATION ON SEVERITY OF ATTACK.*

Case.		Primary Vaccination.	Date of Re-vaccination.	Character of Attack.
H. B.	aged 25	1 mark—poor	6 years ago	Very sparse.
Mrs. M ^c L.	„ 43	1 „ fair	11 „	Sparse.
G. C.	„ 44	1 „ poor	21 „	Very sparse.
W. W.	„ 37	1 „ poor	27 „	Fairly abundant.
J. K.	„ 48	1 „ poor	28 „	Very sparse.
J. R.	„ 43	3 „ poor	31 „	Sparse.
P. M ^c L.	„ 42	2 „ fair	32 „	Very sparse.
A. S.	„ 28	1 „ fair	(?) 4 „	Fairly abundant.

STATEMENT AS TO VACCINATION OF CASES ADMITTED TO HOSPITAL DURING PERIOD OF RECRUDESCENCE, 1901-1902.

AGE.	TOTAL.		
	Vaccinated.	Unvaccinated.	Doubtful.
Under 5 years,	6	15	3
5—10 „	4	2	2
10—15 „	8	2	1
15—20 „	22	...	...
20—25 „	60	3	2
25—35 „	155	3	2
35—45 „	124	1	1
45—55 „	32	1	3
55—65 „	9	...	1
65 and upwards,	4	...	...
All ages,	424	27	15

The widespread distribution of the infection, and the extent to which re-vaccination was resorted to, afforded an opportunity of observing the behaviour of the disease in one section of the population which, in the course of the outbreak, gradually increased until it comprised almost 60 per cent. of the whole. This section comprised those persons who were successfully re-vaccinated before they were exposed to infection between January, 1901, and May, 1902. It may be represented as increasing by fortnightly drafts obtained from the section who were not re-vaccinated, as is shown in the following Table (p. 46).

In respect of susceptibility and the opportunities of exposure to infection, there is nothing to distinguish between these two sections here shown save the solitary circumstance of successful re-vaccination, and the contrast presented by the uniform absence of cases from the re-vaccinated section requires no elaboration.

* During the period of recrudescence 11 cases were admitted with a history of successful re-vaccination before infection, and in 10 of these the statement of the patient was supported by the presence of distinguishable marks. The intervals elapsing between re-vaccination and attack were respectively 3, 3, 4, 7, 8, 9, 12, 26, 32, 40, and 55 years.

TABLE VIII.—GLASGOW.—SMALLPOX, 1901-1902.—UN-REVACCINATED AND RE-VACCINATED POPULATION IN EACH FORTNIGHT, WITH THE CASES OF SMALLPOX OCCURRING IN EACH CLASS.

1901.			NOT RECENTLY RE-VACCINATED.		RECENTLY RE-VACCINATED.	
			Population.	Cases Registered. *	Population.	Cases Registered.
January	12th, ...	...	675,887	23	...	...
"	26th, ...	...	674,816	350	1,071	...
February	9th, ...	...	671,025	202	4,862	...
"	23rd, ...	...	634,213	127	41,674	..
March	9th, ...	...	556,561	299	119,326	...
"	23rd, ...	...	518,426	161	157,461	...
April	6th, ...	...	474,694	92	201,193	...
"	20th, ...	...	429,056	67	246,831	...
May	4th, ...	...	384,371	28	291,516	...
"	18th, ...	...	366,125	18	309,762	...
June	1st, ...	...	352,633	11	323,254	...
"	15th, ...	...	347,777	2	328,110	...
"	29th, ...	...	345,293	8	330,594	...
July	13th, ...	...	281,867	1	394,020	...
November	16th, ...	...	279,452	1	396,435	...
"	30th, ...	...	279,232	5	396,655	...
December	14th, ...	...	279,020	4	396,867	...
"	28th, ...	...	278,796	...	397,091	...
1902.						
January	11th, ...	...	278,623	28	397,264	...
"	25th, ...	...	278,152	23	397,735	...
February	8th, ...	...	277,653	23	398,234	...
"	22nd, ...	...	277,134	147	398,753	...
March	8th, ...	...	276,033	92	399,854	...
"	22nd, ...	...	274,611	85	401,276	...
April	5th, ...	...	272,694	36	403,193	...
"	19th, ...	...	271,619	15	404,268	...
May	3rd, ...	...	271,032	10	404,855	...

* The Cases under five years have not been excluded from these figures, because their allocation through the various fortnights would have been difficult, and their inclusion is unimportant. In the 1900-1901 part of the outbreak these numbered 60, 54 of whom (including 30 cases occurring under one year) were unvaccinated primarily.

EXPENDITURE ON RE-VACCINATION.

From 1st June, 1900, till 1st March, 1902, the amount expended in connection with re-vaccination was as follows:—

Calf Lymph,	...	...	...	...	...	...	£4,570
Fees to Practitioners,	...	...	...	...	...	...	22,776
Do. Extra Vaccination Staff, &c.,	...	...	...	...	...	...	4,177
Do. Prison and Parish Surgeons,	...	...	...	...	...	...	713
Total,	...	...	...	...	...	...	<u>£32,236</u>



CHARTS OF SICKENING.

These charts have been constructed after careful enquiry into the dates of sickening of the cases occurring during the epidemic period and during the whole period of recrudescence. The interval of declining prevalence which occurred in the middle of the epidemic period is shown by a depression beginning on the 1st and extending to 19th February.

The secondary wave of prevalence, which reached its acme on 1st February, is obviously definitely related to the earlier prevalence of 17th January, but the recurring increases, which began on 19th February, and reached their maximum on 2nd March, have a less tangible relationship with the amount of infection which was distributed by the cases sickening about 1st February.

The rapid recurrence, also, of the elevations of 26th February and 2nd March are in striking contrast with the uniform rise and fall of the waves of 17th January and 1st February. They suggest the difference between a source of infection in somewhat continuous operation and one in which the discharge is periodic. The distribution in these later prevalences was pretty general, and the following contrast between the proportions in corresponding fortnights in the Eastern and Southern Districts is important in this respect that the Southern District is beyond Hospital influence, and yet a recurring prevalence late in February was also apparent there:—

PROPORTION OF TOTAL ATTACKS IN EASTERN AND SOUTHERN DISTRICTS OCCURRING
IN SEVERAL FORTNIGHTS OF THE EPIDEMIC PERIOD.

		Eastern Cases, 863.		Southern Cases, 200.
26th January,	=	29·7 per cent.	=	26·0 per cent.
9th February,	=	12·1 „	=	18·5 „
23rd „	=	7·8 „	=	8·5 „
9th March,	=	25·4 „	=	13·0 „
23rd „	=	12·6 „	=	8·0 „

MAPS.

Little need be added by way of a special description of the accompanying maps, I. to VII. In them the administrative divisions of the City are contained within the thick, and the sub-districts within the thin red lines. The former are referred to in the text as Eastern, Central, Western, Northern, North-Western, Southern, and South-Suburban; while the sub-districts are numbered consecutively, a few being distinguished by letters. Save where otherwise stated, the maps are constructed on the number of cases registered fortnightly, but some exceptions occur where the arrangement is according to periods of sickening. Where it was wished to distinguish between the areas involved in successive fortnights a distinguishing colour has been used. The situation of the Hospital is indicated by a red cross, and the circles surrounding it are drawn with radii respectively of $\frac{1}{4}$ mile, $\frac{1}{2}$ mile, 1 mile, and $1\frac{1}{4}$ miles.

In Map I. it will be seen that during the early weeks of the invasion of the disease the direction in which dissociated cases tended to spread was northerly, whereas in the fortnights ending 2nd, 16th, and 30th June there was a quite definite distribution of cases in the Eastern Division (see Map II.).

In the several fortnights shown on this map the sicknesses occurred on the following dates, and it may be observed regarding the sicknesses occurring towards the end of May that the wind was continuously from the east between the 7th and 13th of the month, south-east on the 6th, and north-east on the 14th.

On all the other days, save the last two, the direction varied to the north or south of west. From 30th May to 4th June the wind was east.

RECORD OF DAILY SICKENINGS IN EASTERN DISTRICT—MAY AND JUNE, 1900.

Fortnight ending 2nd June.	Number Sickening.	Fortnight ending 16th June.	Number Sickening.	Fortnight ending 30th June.	Number Sickening.
24th May, -	2	3rd June, -	...	17th June, -	3
25th „ -	...	4th „ -	2	18th „ -	2
26th „ -	...	5th „ -	...	19th „ -	1
27th „ -	1	6th „ -	1	20th „ -	3
28th „ -	...	7th „ -	...	21st „ -	2
29th „ -	2	8th „ -	4	22nd „ -	2
30th „ -	3	9th „ -	2	23rd „ -	4
31st „ -	4	10th „ -	4	24th „ -	1
1st June, -	2	11th „ -	3	25th „ -	4
2nd „ -	2	12th „ -	3	26th „ -	...
		13th „ -	5	27th „ -	...
		14th „ -	3	28th „ -	...
		15th „ -	2	29th „ -	...
		16th „ -	...	30th „ -	...
	<hr/> 16 <hr/>		<hr/> 29 <hr/>		<hr/> 22 <hr/>

During the weeks of July and August cases were recorded in the situations already indicated in Map II., but also extending eastwards from Parkhead Cross along Westmuir Street and Great Eastern Road.

Map III. shows the cases recorded in the fortnights ending 1st, 15th, and 29th December, 1900, and 12th January, 1901, and in respect of numbers affords a striking contrast with those occurring in the following fortnight, shown in Map IV.

In Map V. the distribution of the cases forming the major part of the second rise, culminating on March 2nd, are shown; and if any distinction is to be drawn between this and that shown on Map IV., it might be said that, while in the earlier period the cases in the Eastern District tend to aggregation along main lines of traffic, the distribution in the second fortnight is more uniformly spread over the intervals between these lines.

Map VI. covers the whole period of recrudescence until 1st May, 1902. The distribution of the earlier cases between November and February is indicated by blue dots, and one of the most striking episodes in the recurrence is shown on Map VII., when in the fortnight ending 22nd February the whole character of the recrudescence became altered, and we had repeated, on lines very similar to those of the major outbreak, an epidemic activity which in numbers amounted to quite one-third of the volume occurring in corresponding months of 1901.

Some reference has already been made to the prevailing meteorological conditions in May, 1900, and more complete details will be found in Appendices. The annexed summaries of the conditions prevailing during several months when the disease was most active are also by Professor Becker. It may be observed with regard to the increased prevalence late in February, 1901, that on the 2nd and 13th only was the wind easterly, while the increase began on the 19th.

A. K. CHALMERS, M.D.

SANITARY CHAMBERS,
GLASGOW, May, 1902.

APPENDICES.

METEOROLOGICAL OBSERVATIONS TAKEN AT GLASGOW OBSERVATORY
DURING MAY, 1900.

Day of the Month.	Humidity per cent.		MIDNIGHT TO MIDNIGHT.			REMARKS.
	9 a.m.	9 p.m.	Wind.	Rain.		
			General Direction.	Inches.	Hours.	
1	60	71	W.	·01	1	Slight rain in morning. Solar halo at 7 p.m. Cloudy and dull.
2	84	75	S.W.	·08	5	Heavy rain in morning. Cloudy and fine.
3	76	80	S.W.	·21	14	Cloudy and heavy showers.
4	83	74	S.	·20	5	Heavy rain in morning. Overcast and squally.
5	88	70	S.	·07	6	Rain in morning. Cloudy and fine.
6	63	93	S.E.	·20	7	Morning cloudy. Rain afternoon and evening.
7	93	86	E.	·18	10	Rain in morning. Dull. Evening cloudy.
8	73	81	E.	·02	2	Cloudy. Slight rain in evening.
9	69	79	E.	·13	5	Heavy rain in morning. Cloudy. Evening dull.
10	72	74	E.	...	...	Cloudy and dull.
11	74	74	E.	...	...	Generally overcast.
12	76	72	E.	·09	8	Rain in morning. Cloudy and dull.
13	62	74	E.	...	...	Cloudy and dull.
14	58	75	N.E.	...	...	Cloudy and fine.
15	60	69	W.	...	...	Clear and fine.
16	49	70	N.W.	...	...	Clear and fine.
17	63	69	N.W.	...	...	Cloudy and fine.
18	64	52	N.	...	...	Cloudy and dull.
19	65	74	W.	...	...	Cloudy and fine.
20	62	75	W.	...	...	Cloudy and dull.
21	83	94	S.	·42	10	Overcast and rain.
22	77	83	S.W.	·17	12	Cloudy and heavy showers.
23	85	89	S.W.	·07	3	Rain morning and afternoon. Cloudy.
24	59	78	W.	...	...	Cloudy and fine.
25	68	87	W.	·01	1	Slight rain in morning. Cloudy.
26	72	79	S.W.	·03	4	Cloudy and dull. Rain in evening.
27	81	92	S.W.	·25	13	Overcast and rain.
28	84	80	W.	·02	3	Rain in morning. Squally. Dull and cloudy.
29	66	73	N.W.	...	...	Clear and fine.
30	66	74	E.	...	...	Clear and fine. Evening dull.
31	77	80	E.	...	...	Dull and overcast.

METEOROLOGICAL OBSERVATIONS TAKEN AT GLASGOW OBSERVATORY
DURING JUNE, 1900.

Day of the Month.	Humidity per cent.		MIDNIGHT TO MIDNIGHT.			REMARKS.
			Wind.	Rain.		
	9 a.m.	9 p.m.	General Direction.	Inches.	Hours.	
1	79	83	E.	...	...	Morning and evening dull. Afternoon clear.
2	80	73	E.	...	...	Morning dull. Clear and fine.
3	68	63	E.	...	...	Clear and fine.
4	72	87	E.	...	...	Clear and fine. Evening cloudy.
5	88	79	N.E.	...	...	Cloudy and dull.
6	79	87	N.E.	...	...	Cloudy and dull.
7	86	91	E.	·18	6	Rain morning and afternoon. Cloudy, thunder and lightning at 3.30 p.m.
8	85	81	E.	·01	2	Dull, and evening cloudy.
9	94	86	S.	·14	6	Overcast. Drizzling rain.
10	66	74	S.	...	...	Cloudy and dull.
11	71	83	W.	·02	1	Cloudy. Shower about 7.20 p.m. Thunder at 8 p.m.
12	80	92	E.	·14	7	Thunderstorm and rain morning and evening. Dull.
13	86	90	E.	·51	12	Cloudy. Thunderstorm morning and afternoon. Heavy rain.
14	77	75	S.W.	...	...	Cloudy and fine.
15	63	87	S.E.	...	...	Cloudy and dull.
16	74	89	W.	·18	3	Cloudy. Rain at night.
17	75	76	W.	·08	9	Rain in morning. Clear and fine.
18	69	78	S.W.	...	...	Cloudy. Evening dull.
19	87	77	S.	·29	8	Rain morning and afternoon. Overcast.
20	86	85	S.W.	·40	9	Heavy rain in morning. Thunder in afternoon. Slight rain at 10 p.m.
21	71	91	W.	·39	6	Cloudy and dull. Heavy rain and thunder in afternoon.
22	69	82	W.	·23	4	Rain in morning. Thunder at noon. Cloudy.
23	65	73	W.	...	...	Clear and fine.
24	81	95	E.	1·36	16	Overcast and heavy rain.
25	68	81	N.E.	·04	3	Rain in morning. Cloudy and dull.
26	68	84	N.W.	...	...	Overcast. Evening cloudy.
27	71	77	W.	...	...	Cloudy and fine.
28	59	74	S.W.	·01	1	Morning fine. Dull. Slight rain at night.
29	73	95	S.W.	·16	10	Rain morning and evening. Overcast.
30	85	94	W.	·20	8	Cloudy. Rain at night.

METEOROLOGICAL OBSERVATIONS TAKEN AT GLASGOW OBSERVATORY FROM
26TH DECEMBER, 1900, TO 31ST JANUARY, 1901.

Day of the Month.	Humidity per cent.		MIDNIGHT TO MIDNIGHT.			REMARKS.
			Wind.	Rain.		
	9 a.m.	9 p.m.	General Direction.	Inches.	Hours.	
Dec.						
26	84	88	S.W.	·01	1	Dull and cloudy.
27	95	85	E.	·36	13	Overcast and rain.
28	92	65	N.W.	·13	7	Rain morning and afternoon. Squally.
29	85	88	W.	·06	2	Slight showers in morning. Fine. Haze and sleet at night.
30	96	82	E.	·51	17	Overcast and rain. Cloudy at night.
31	86	81	N.E.	...	...	Dull and overcast.
Jan.						
1	86	90	S.W.	·13	7	Cloudy and showery.
2	92	94	S.W.	·03	4	Rain in morning. Cloudy. Fog at night.
3	92	86	S.W.	...	...	Dull and hazy.
4	95	79	S.W.	...	...	Dull and overcast.
5	86	82	S.E.	...	...	Cloudy and dull. Hazy at night.
6	73	69	E.	...	...	Hoar frost in morning. Cloudy and dull.
7	82	84	E.	...	...	Dull and overcast.
8	89	85	E.	·07*	5	Dull and overcast. Snow in forenoon.
9	83	82	E.	...	...	Cloudy and misty. Hoar frost at night.
10	96	93	E.	·05	3	Overcast. Rain in afternoon.
11	96	91	E.	·12	6	Dull and hazy. Rain afternoon and evening.
12	92	89	E.	...	...	Cloudy and hazy.
13	85	79	E.	...	...	Dull and overcast.
14	81	66	N.E.	...	...	Cloudy and hazy.
15	74	68	N.E.	...	...	Cloudy and hazy in morning. After- noon and evening clear.
16	79	91	N.E.	...	...	Cloudy and dull.
17	91	85	S.W.	·01	5	Slight rain in morning. Cloudy.
18	92	93	S.W.	·13	5	Rain morning and afternoon. Cloudy.
19	96	92	N.E.	·39	11	Overcast and rain. Evening cloudy.
20	81	82	W.	·13	10	Overcast, squally and showery.
21	87	84	W.	·02	3	Overcast and rain in forenoon. Cloudy and squally in evening.
22	95	81	W.	·13	10	Squally and rain morning and after- noon. Evening cloudy.
23	83	77	S.W.	...	...	Dull.
24	93	91	S.W.	·10	8	Dull and showery. Squally in evening.
25	83	77	W.	·41*	12	Rain in morning. Squally and cloudy. Showers of snow.
26	78	98	W.	·26*	12	Snow, 2½ inches deep, in morning. Dull. Rain in afternoon and evening.
27	67	93	N.W.	·30	18	Squally, cloudy, showers of hail, rain, and snow.
28	100	86	W.	·17+	5	Cloudy, and snow showers, 2¾ inches deep. Lunar corona at 6 p.m.
29	90	75	N.W.	·01+	5	Cloudy and dull.
30	73	73	N.W.	...	...	Cloudy and dull. Lunar halo and corona at 7.30 p.m.
31	72	72	N.W.	...	...	Clear and fine. Lunar corona at 9.15 p.m., and halo at 10.30 p.m.

* Rain and Melted Snow.

† Melted Snow.

METEOROLOGICAL OBSERVATIONS TAKEN AT GLASGOW OBSERVATORY
DURING FEBRUARY, 1901.

Day of the Month.	Humidity per cent.		MIDNIGHT TO MIDNIGHT.			REMARKS.
	9 a.m.	9 p.m.	Wind.	Rain.		
			General Direction.	Inches.	Hours.	
1	78	96	W.	·05	5	Dull. Rain in afternoon.
2	81	80	N.E.	...	...	Cloudy and dull.
3	89	74	N.W.	...	...	Clear and fine.
4	90	73	N.W.	·14*	4	Snow, 1 inch deep, in forenoon. Dull. Evening cloudy.
5	73	72	N.	...	...	Clear and fine.
6	62	68	N.	...	...	Clear and fine. Evening overcast.
7	96	95	W.	·05	2	Rain in morning. Cloudy and dull.
8	86	88	W.	...	...	Dull and overcast. Evening clear.
9	91	86	W.	...	...	Clear and fine. Evening hazy.
10	93	88	W.	...	...	Morning misty. Cloudy. Evening dull.
11	53	79	N.	...	...	Clear and fine.
12	88	77	W.	...	...	Cloudy and fine.
13	75	79	E.	·04*	4	Snow in morning. Cloudy. Evening clear.
14	...	72	N.W.	...	...	Hoar frost and fog in morning. Clear. Evening hazy.
15	79	89	W.	...	...	Hoar frost and haze in morning. Clear and fine.
16	91	59	N.W.	...	...	Clear and fine.
17	70	79	N.	...	...	Cloudy and dull.
18	91	92	W.	...	...	Cloudy and dull.
19	99	85	E.	...	...	Morning foggy. Cloudy and misty.
20	91	87	W.	...	...	Cloudy and misty. Thick fog at intervals. Hoar frost at night.
21	...	88	W.	...	...	Hoar frost and haze morning and evening. Cloudy. Evening clear.
22	92	86	W.	...	...	Cloudy and dull.
23	82	90	W.	...	...	Dull and overcast
24	90	99	W.	·53	17	Overcast and rain.
25	96	90	E.	·13	20	Overcast and rain.
26	91	89	S.E.	·50	18	Overcast and rain.
27	95	74	E.	·11	8	Rain in morning. Cloudy and dull.
28	85	88	E.	...	...	Dull and overcast.

* Melted Snow.

METEOROLOGICAL OBSERVATIONS TAKEN AT GLASGOW OBSERVATORY FROM
16TH JANUARY TILL 28TH FEBRUARY, 1902.

Day of the Month.	Humidity per cent.		MIDNIGHT TO MIDNIGHT.			REMARKS.
			Wind.	Rain.		
	9 a.m.	9 p.m.	General Direction.	Inches.	Hours.	
Jan.						
16	84	92	W.	...	...	Dull.
17	85	88	W.	...	...	Overcast. Cloudy at night.
18	97	80	S.W.	...	...	Fog in morning. Dull.
19	95	87	S.W.	·01	2	Dull. Squally and rain at night.
20	94	93	W.	·49	17	Heavy rain in morning. Dull. Slight rain at night.
21	96	95	S.W.	·39	22	Overcast and rain.
22	91	97	S.W.	·01	4	Dull. Slight drizzle morning and night.
23	86	78	S.W.	·04	5	Drizzle in morning. Dull. Rain after 11.20 p.m.
24	94	80	W.	·47	15	Overcast and rain. Showers of snow afternoon and night.
25	84	...	W.	·02	1	Slight snow in morning. Cloudy. Evening clear.
26	56	74	N.W.	...	...	Clear and fine. Evening dull.
27	61	93	E.	...	...	Dull. Snow after 2 p.m.
28	83	53	N.	·15	12	Snow in morning. Cloudy. Evening clear. Snow lying 2½ inches deep.
29	98	58	N.W.	·09	5	Snow in morning. Clear and fine. Snow lying 5½ inches deep.
30	100	92	W.	...	...	Hoar frost and fog.
31	...	83	E.	...	...	Hoar frost and fog in morning. Evening clear. Aurora about 11 p.m.
Feb.						
1	84	85	E.	...	...	Hoar frost and snow lying in morning. Fine. Evening dull.
2	85	89	E.	·01	3	Dull. Slight rain at night.
3	83	75	E.	...	...	Slight rain in morning. Cloudy and dull.
4	85	78	E.	...	...	Morning hazy. Dull and overcast.
5	76	79	S.W.	...	...	Hoar frost in morning. Dull and hazy.
6	80	98	S.W.	·05	2	Overcast. Rain between 5 and 7 p.m. Evening cloudy.
7	...	62	N.E.	...	...	Hoar frost. Cloudy and hazy. Evening dull.
8	78	61	E.	·04*	3	Slight snow morning and night. Cloudy.
9	85	56	W.	...	...	Snow lying ½ inch deep. Fine. Evening clear. Aurora about 8 p.m.
10	76	74	W.	...	...	Morning hazy. Clear and fine.
11	68	68	N.W.	...	...	Hoar frost and haze in morning. Clear and fine.
12	82	74	W.	·07*	3	Snow in morning, 1 inch deep. Clear and fine.
13	100	72	S.	...	...	Hoar frost in morning. Foggy. Snow lying.
14	86	76	W.	...	...	Morning dull and snow lying. Cloudy. Lunar halo and corona at 7 p.m.
15	85	85	S.W.	...	...	Hoar frost and fog in morning. Fine. Evening dull.
16	80	62	S.	...	...	Dull and overcast.
17	53	70	E.	...	...	Dull and hazy.
18	68	95	E.	...	...	Morning hazy. Fine. Evening dull.
19	85	85	E.	...	...	Dull and overcast.
20	86	96	S.E.	...	...	Dull and overcast.
21	87	87	S.	...	...	Dull and overcast.
22	88	89	S.E.	·16	5	Overcast. Rain after 8 p.m.
23	98	93	E.	·39	11	Morning showery. Overcast. Heavy rain at night.
24	84	91	E.	·34	13	Overcast and rain.
25	94	90	N.E.	·05	5	Rain in morning. Cloudy and dull.
26	80	77	E.	...	...	Cloudy. Breezy.
27	90	87	E.	·07†	6	Snow in morning. Afternoon showery. Dull.
28	91	97	N.E.	·30	12	Overcast and rain. Evening cloudy.

* Melted Snow.

† Rain and Melted Snow.

MAY, 1900.

TEMPERATURE, &C., AS DEPENDING ON THE DIRECTION OF THE WIND.

Direction.	Days.	Mean Temp.	Mean Max. Temp.	Mean Min. Temp.	Total Sun- shine.	Average Daily Sun- shine.	Total Rain.	Average Daily Rain.	Average Hourly Velocity of Wind.
		Deg.	Deg.	Deg.	Hours.	Hours.	Inches.	Inches.	Miles.
North,	1	47·8	55	42	4	4·0	0·00	0·00	8·0
North-East,	1	46·4	56	38	9	9·0	0·00	0·00	7·0
East,	9	47·8	54	42	33	3·7	0·42	0·05	9·7
South-East,	1	48·9	58	42	4	4·0	0·20	0·20	10·0
South,	3	50·7	55	46	8	2·7	0·61	0·23	17·3
South-West,	6	51·2	57	46	18	3·0	0·81	0·14	13·8
West,	7	50·2	58	44	44	6·3	0·04	0·01	11·3
North-West,	3	54·0	64	45	33	11·0	0·00	0·00	9·3

JUNE, 1900.

TEMPERATURE, &C., AS DEPENDING ON THE DIRECTION OF THE WIND.

Direction.	Days.	Mean Temp.	Mean Max. Temp.	Mean Min. Temp.	Total Sun- shine.	Average Daily Sun- shine.	Total Rain.	Average Daily Rain.	Average Hourly Velocity of Wind.
		Deg.	Deg.	Deg.	Hours.	Hours.	Inches.	Inches.	Miles.
North,	0	...	...	...	...	...	...	...	...
North-East,	3	54·5	66	47	9	3·0	0·04	0·01	8·7
East,	9	54·8	65	49	50	5·6	2·20	0·24	9·9
South-East,	1	58·8	66	48	1	1·0	0·00	0·00	6·0
South,	3	57·5	65	52	5	1·7	0·43	0·14	11·0
South-West,	5	56·9	64	51	25	5·0	0·57	0·11	8·8
West,	8	57·4	65	52	56	7·0	1·10	0·14	8·4
North-West,	1	55·4	60	50	4	4·0	0·00	0·00	9·0

DECEMBER, 1900.

TEMPERATURE, &C., AS DEPENDING ON THE DIRECTION OF THE WIND.

Direction.	Days.	Mean Temp.	Mean Max. Temp.	Mean Min. Temp.	Total Sun- shine.	Average Daily Sun- shine.	Total Rain.	Average Daily Rain.	Average Hourly Velocity of Wind.
		Deg.	Deg.	Deg.	Hours.	Hours.	Inches.	Inches.	Miles.
North,	0	...	...	...	...	...	...	...	...
North-East,	3	39·9	42	38	0	0·0	1·45	0·48	8·0
East,	4	40·7	43	39	0	0·0	1·16	0·29	8·8
South-East,	2	42·4	44	41	0	0·0	0·40	0·20	7·5
South,	1	41·7	49	39	0	0·0	0·06	0·06	7·0
South-West,	18	46·7	49	43	5	0·3	3·71	0·21	20·0
West,	2	39·8	44	37	5	2·5	0·43	0·22	16·0
North-West,	1	42·5	45	41	0	0·0	0·13	0·13	19·0

JANUARY, 1901.

TEMPERATURE &C., AS DEPENDING ON THE DIRECTION OF THE WIND.

Direction.	Days.	Mean Temp.	Mean Max. Temp.	Mean Min. Temp.	Total Sun- shine.	Average Daily Sun- shine.	Total Rain.	Average Daily Rain.	Average Hourly Velocity of Wind.
		Deg.	Deg.	Deg.	Hours.	Hours.	Inches.	Inches.	Miles.
North,	0	...	...	...	...	...	...	...	...
North-East,	4	38·6	43	35	0	0·0	0·39	0·10	10·3
East,	8	37·0	39	34	2	0·3	0·24	0·03	10·1
South-East,	1	38·6	43	34	0	0·0	0·00	0·00	9·0
South,	0	...	...	...	...	...	...	...	..
South-West,	8	42·1	45	39	5	0·6	0·40	0·05	11·1
West,	6	39·1	45	35	2	0·3	1·12	0·19	18·2
North-West,	4	36·6	41	32	10	2·5	0·31	0·08	15·8

FEBRUARY, 1901.

TEMPERATURE, &C., AS DEPENDING ON THE DIRECTION OF THE WIND.

Direction.	Days.	Mean Temp.	Mean Max. Temp.	Mean Min. Temp.	Total Sun-shine.	Average Daily Sun-shine.	Total Rain.	Average Daily Rain.	Average Hourly Velocity of Wind.
		Deg.	Deg.	Deg.	Hours.	Hours.	Inches.	Inches.	Miles.
North,	4	34·3	38	30	20	5·0	0·00	0·00	7·3
North-East,	1	38·4	42	35	3	3·0	0·00	0·00	8·0
East,	5	38·2	42	35	4	0·8	0·28	0·06	7·0
South-East,	1	42·3	44	39	0	0·0	0·50	0·50	9·0
South,	0	...	...	...	...	...	...	...	...
South-West,	0	...	...	...	...	...	...	...	...
West,	13	37·9	43	33	21	1·6	0·63	0·05	7·2
North-West,	4	34·8	40	30	14	3·5	0·14	0·04	6·5

JANUARY, 1902.

TEMPERATURE, &C., AS DEPENDING ON THE DIRECTION OF THE WIND.

Direction.	Days.	Mean Temp.	Mean Max. Temp.	Mean Min. Temp.	Total Sun-shine.	Average Daily Sun-shine.	Total Rain.	Average Daily Rain.	Average Hourly Velocity of Wind.
		Deg.	Deg.	Deg.	Hours.	Hours.	Inches.	Inches.	Miles.
North,	1	30·6	37	27	1	1·0	0·15	0·15	7·0
North-East,	0	...	...	...	...	...	...	...	...
East,	3	26·9	32	21	0	0·0	0·00	0·00	5·3
South-East,	0	...	...	...	...	...	...	...	...
South,	2	33·6	37	30	0	0·0	0·21	0·11	7·0
South-West,	9	44·8	47	42	0	0·0	1·28	0·14	16·2
West,	14	40·3	44	36	8	0·6	1·26	0·09	14·6
North-West,	2	28·5	33	24	10	5·0	0·09	0·05	10·5

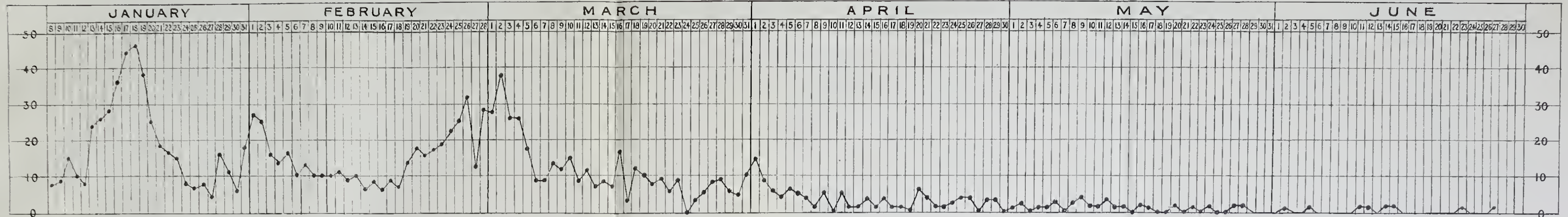
FEBRUARY, 1902.

TEMPERATURE, &C., AS DEPENDING ON THE DIRECTION OF THE WIND.

Direction.	Days.	Mean Temp.	Mean Max. Temp.	Mean Min. Temp.	Total Sun-shine.	Average Daily Sun-shine.	Total Rain.	Average Daily Rain.	Average Hourly Velocity of Wind.
		Deg.	Deg.	Deg.	Hours.	Hours.	Inches.	Inches.	Miles.
North,	0	...	...	...	...	...	...	...	...
North-East,	3	37·3	40	35	0	0·0	0·35	0·12	10·0
East,	12	37·1	40	34	8	0·7	0·85	0·07	10·9
South-East,	2	38·3	40	37	0	0·0	0·16	0·08	7·5
South,	3	33·3	37	30	0	0·0	0·00	0·00	9·3
South-West,	3	34·2	38	30	3	1·0	0·05	0·02	8·3
West,	4	31·2	37	25	15	3·8	0·07	0·02	7·0
North-West,	1	29·0	33	27	7	7·0	0·00	0·00	7·0

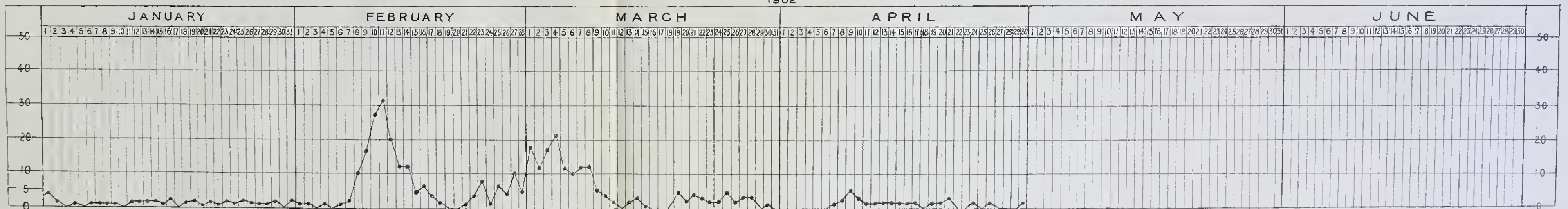
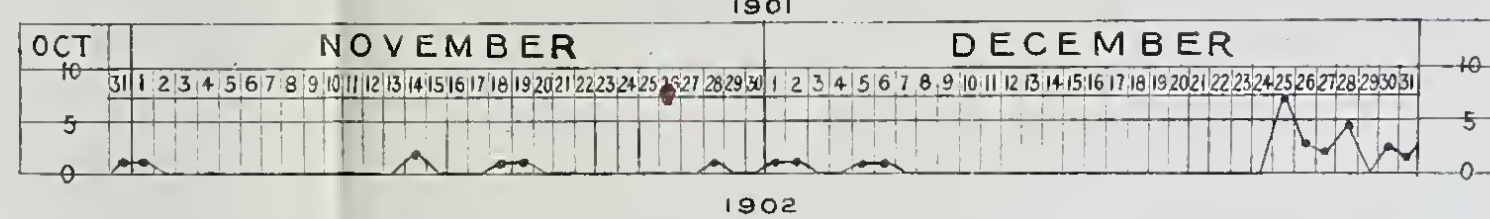
CHART, A

SMALLPOX 1901. (*Epidemic Period*)
NUMBER OF CASES SICKENING DAILY.



CHART, B

SMALLPOX 1901.-2 (*Recrudescence*)
NUMBER OF CASES SICKENING DAILY.



ROAD MAP
OF THE
COUNTY OF THE CITY OF GLASGOW
AND THE VICINITY
Compiled from various sources
BY J. WILSON & SONS
GLASGOW



CASES REGISTERED.

Fortnight ending 21st April, 1900, shown thus .
 " " 5th May, " " " in black dots.
 " " 19th " " " " green "
 " " 2nd June, " " " " blue "

In this and following maps the hospital is represented by a Red Cross.

ROAD MAP
OF THE
COUNTY OF THE CITY OF GLASGOW
AND THE VICINITY
PUBLISHED BY THE GLASGOW CITY COUNCIL



EASTERN CASES REGISTERED.

Fortnight ending 1st December, 1900,	shown in black dots.
" " 15th " " "	blue "
" " 29th " " "	green "
" " 12th January, 1901,	orange "

MAP III.



ROAD MAP
OF THE
COUNTY OF THE CITY OF GLASGOW
AND THE VICINITY
1890



EASTERN CASES SICKENING.
Fortnight ending 2nd June, 1900, shown in black dots.
" " 16th " " " blue "
" " 30th " " " green "



ROAD MAP
OF THE
COUNTY OF THE CITY OF GLASGOW
AND THE VICINITY
Copyright 1901 by James Watson & Co. Ltd.



ALL CASES REGISTERED.
Fortnight ending 26th January, 1901.

MAP IV.



ROAD MAP
OF THE
COUNTY OF THE CITY OF GLASGOW
AND THE VICINITY
Compiled from Aerial Survey
BY THE
GLASGOW CITY COUNCIL



ALL CASES REGISTERED.
Fortnight ending 9th March, 1901.



ROAD MAP
OF THE
COUNTY OF THE CITY OF GLASGOW
AND THE VICINITY
1901 and 1902



RECRUDESCENCE—
November, 1901, to 1st May, 1902.
Prior to 14th February shown in blue:
others shown in black.

MAP VI.





ROAD MAP
OF THE
COUNTY OF THE CITY OF GLASGOW
AND THE VICINITY
Compiled from Actual Survey



EASTERN CASES ONLY.
Fortnight ending 22nd February, 1902.





26 FEB. 1929

